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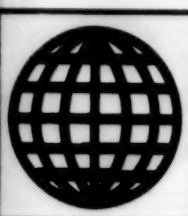

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JPRS Report

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EU Fourth Framework Aims, Funding Viewed

BR1602100594 Paris BIOFUTUR in French Jan 94 p32

[Article signed Olivier Revelant: "Fourth Framework Program: A Difficult Birth"]

[Text] European research has just had a close shave. Against the backdrop of the Treaty of Maastricht, the persistent disagreement between the European Parliament and the Council of Ministers almost sabotaged the implementation of the fourth framework program for research and development. It came within an inch of seeing its coffers empty at the start of 1995.

The formal proposal and the content of the specific programs of the fourth framework program for technological research and development were approved by the European Commission 6 October 1993. The total sum proposed for life sciences amounted to 1.265 billion ECU [European Currency Units]. This represents 10 percent of the total framework program budget—13.1 billion ECU—to which we should add the 600 million ECU earmarked for the Community's joint research center whose status is currently under discussion. The joint research center consists of four structures located in Ispra [Italy], Petten [Netherlands, Institute of Advanced Materials], Geel [Belgium, Institute of Measurement and Reference Materials], and Karlsruhe [Germany, Transuranian Institute]. It is directed by Jean-Pierre Contzen. We must bear in mind that the budget for the third framework program was only 6.6 billion ECU. However, the budget has not risen significantly: The two framework programs differ in that now no Community research can be carried out outside of the framework program. In this context, the budget for the fourth framework program has risen by no more than five percent.

General Content of the Program

According to the most recent estimates, the life sciences budget will be split up as follows: 46 to 50 percent to the biotechnologies sector; 15 to 19 percent to biomedicine and health; 33 to 37 percent to the application of living sciences to agriculture and fishing (this sector also includes agro-industries, forestry, rural development, and food technologies), and 4 to 8 percent on cross-disciplinary demonstration activities. The aim of these activities is to establish the technical feasibility of new approaches: They must simplify the transfer of technology to the users. Lastly, one to three percent of the budget will go to finance legal, ethical, and social aspects in order to improve dialogue between the main national and sociopolitical viewpoints. The subjects examined will include the problems raised by biodiversity, organ transplants, the confidentiality of genetic information, genetic therapy, and genetic fingerprinting. This activity concerns the three domains of biotechnology, biomedicine and health, and agro-industrial research.

For biotechnologies, the priorities will range from the "cell factory" (combining biological approaches and engineering dedicated to solving industrial problems), to the molecular biology of plants, cellular communication in neuroscience (cooperation with the international Human Frontiers program should in particular be strengthened), and genome analysis. It should be noted that the Commission's proposal once again refers to the analysis of genomes, and not merely to the human genome, contrary to the heading of the first version. AIDS, infectious illnesses (tuberculosis), cancer, and pharmaceutical and chemical research (in particular in vitro toxicity tests and the development of new animal models) will receive Community funding in the biomedicine and health sector. Finally, where the application of living science and technology to agriculture and fishing is concerned, the Community will focus its efforts on creating projects that affect all aspects of the transformation process for the main crops and products (from agriculture to the finished product, food and otherwise).

A Complex Decisionmaking Process

The delays noted in setting up this fourth framework program are mainly due to the coming into force of the Maastricht Treaty which ushered in European Union on 1 November 1993. To provide for this delay, the third framework program budget was extended in June 1993 by 900 million ECU. The Treaty on European Union considerably alters the Community decisionmaking processes: The European Council, after consulting the parliament, votes by a qualified majority on specific programs. Thus, 23 programs figured in the Council's last version, while the Commission was proposing 18. The establishment of programs, whether under the Single European Act or the Treaty of the Union, is a two-stage procedure: one stage for the program and another stage for specific programs. However, while for the third framework program the specific programs were approved by the qualified majority vote of the Council after consulting the parliament, the fourth framework program must be approved unanimously by both the Council and the European Parliament (the coordination procedure). In the event of disagreement, and unlike the procedure under the Single Act, the program may be read a third time before parliament with the prior constitution of a conciliation committee.

Delayed Approval

In this new decisionmaking framework, most Member States supported the Commission's proposal at a meeting held in Luxembourg on 11 October 1993. However, the main capital providers—France, Germany, and the United Kingdom—found the total sum a bit steep and would be happy with a total budget of just 10 billion ECU. The Council in particular considered the increase in the grants to the IT and communications technologies sector and to the energy sector to be too high (from four to seven percent and from one to four percent respectively). It is clear that this three-way opposition was vital to keeping to the schedule for program implementation, all the more so since certain countries, after having given their support on 11 October, were on the point of backing down. On 18 November, at the second reading, the parliament decided to test out the new powers granted to it in the Treaty on European Union and voted for a budget higher than the

one proposed by the Commission (13.7 billion ECU with an unchanged global budget for life sciences) after having made some 140 amendments, most of which originated with the Energy and Technological Research Commission [CERT]. For the parliament, the extra monies were justified by the fact that certain programs (Thermie, for example) now fall under the auspices of the program, and by the need to finance the socio-economic measures (100 million ECU).

The finale came on 6 December, when the Council submitted a new proposition to the parliament. An agreement was reached on the distribution of the funds, but not on the total: the Council proposed a budget of 11.5 billion ECU. Biology was particularly well funded, with a budget representing 15 percent of the overall total. The framework program is split into four subprograms: technological R&D and demonstration; cooperation with third countries and international organizations; the distribution and use of the results of Community research; and the training and mobility of researchers. The life sciences budget represents 13.1 percent of the first subprogram which itself represents 27.8 percent of the total, a higher figure than that proposed by the Commission. This boost to the life sciences budget received the strong backing of Portugal, Greece, Ireland, and Spain since it includes the agriculture and fishing sectors. We should note that the industrial technologies budget has also been raised (16.2 percent) while the budget for information technologies has been cut (28 percent). The parliament will not be able to examine this proposal until February 1994. The logical hypothesis is that it will again amend the text before ratifying it, which would constitute a rejection, since the text must be approved in the same terms by both structures. It is nonetheless possible that agreement will be reached on a budget of about 13 billion ECU—which would suit the parliament—one billion of which would be frozen—which would suit the Council. This proposal has received the backing of all countries except for Germany (for technical reasons). The Treaty of the Union favors this type of solution since it imposes a review of financial perspectives in 1996. France also proposed that the Heads of State decide on the budget total at the European Council meeting of 10 and 11 December, since all negotiations have to be completed before the end of the current legislative term in June 1994. Agreement was finally reached on a high total: 12 billion Ecu plus 1.12 billion ECU in reserve. The Council of Ministers ratified this decision at its meeting on 22 December. It suggested that 5.9 billion ECU be assigned in the first two years with 6.1 billion ECU for the following two years (while holding back the frozen one billion ECU). The joint research center would benefit from a budget of 875 million ECU. In the best possible hypothesis, the parliament would rule on the dossier in the last week of January and the whole thing could be approved according to Parliamentary procedure A, i.e. without a plenary session debate and with an almost automatic vote. This agreement, obtained in extremis, would make it possible to avoid the coffers of European research being empty on 1 January 1995 and Greece, which is to take over the EC presidency from Belgium on 1 January 1994, will not then inherit this thorny issue.

German Research Association Approves Additional R&D Projects

MI1102114294 Weinheim FORSCHUNG MITTEILUNGEN DER DFG in German No 4, 1993 p 27

[Text] The Senate of the German Research Association [DFG] has decided to set up 14 new priority programs and to extend three others. In the Senate's opinion, 13 other programs out of a total of 45 new applications and four for extensions deserved funding in full on technical grounds but had to be rejected because of the DFG's tight financial situation. The other applications were also considered to be interesting and attractive by the Senate. There will be three new priority programs in the humanities and social sciences, and in the biological sciences. Five new programs will be set up in the natural sciences and one will be extended. There will be three new programs in engineering sciences and two others will be extended.

Many of the priority programs deal with current problems. In the social sciences and humanities, the program entitled "Global Environmental Changes: Social and Behavioral Science Dimensions" will examine the role of man as the cause and victim of these problems. How does the individual cope with global environmental changes? How do social groups and nations react? This interdisciplinary program intends to develop environmental and economic solutions. It will also analyze the endangered ecosystem of the third world, with emphasis on population growth and migration. The program entitled "Efficient Organization of Financial Markets and Institutions" also deals with contemporary problems. Germany's financial infrastructure is about to be fundamentally reorganized so as to improve international competitiveness. It is envisaged that the problems raised by the reorganization will be identified and solved by coordinated research. The theme of the third new priority program in the field of social sciences and humanities is "Information Processing in a Social Context."

Priority programs in the biological sciences will be set up on the following topics: "Molecular Analysis of Regulation Networks in Bacteria," "Metabolism and Growth of Plants under Increased CO2 Concentrations," and "Genetic Analysis of Social Systems." In this last program, groups concerned with sociobiology and molecular genetics are working together. They are studying adaptation by natural and sexual selection during the course of evolution. How do pairing systems and propagation strategies develop in the animal kingdom? How can the division of labor and altruism be explained?

The five newly launched priority programs in the natural sciences are: "Ergodic Theory, Analysis and Efficient Simulation of Dynamic systems," "Theory of Relativistic Effects in the Chemistry and Physics of Heavy Elements," "Structure and Function of Polyhedral Structures Composed of Main Group Elements," "Change in the Geobiosphere over the Past 15,000 Years - Continental Sediments as an Expression of Changing Environmental

Conditions," and "Refractory Organic Acids in Open Waters." The "II-VI Semiconductors" program is being extended.

The new programs in the engineering sciences are "Mobile Communications," "Efficient Algorithms for Discrete Problems and their Application," and "Supercooled Metal Melts-Phase Selection and Glass Formation." The programs "Ion and Plasma Surface Technology," and "Innovative Quality Assurance in Production" are being extended. Basic research and industry will work together in the "Mobile Communications" program. Experts from microelectronics and high frequency engineering intend to solve the problems of transmitting and switching long-distance calls.

The funding for the 17 newly launched and extended programs amounts to 48.2 million German marks [DM]. In 1994, the DFG will support 104 priority programs altogether with subsidies totaling DM224.9 million. A typical feature of these funding procedures is the supraregional cooperation between the participating scientists. Researchers from various institutions and disciplines work together for a limited time, mostly six years. In addition to special research fields, priority programs are the most important method of promoting interdisciplinary coordinated research.

EU To Support Electronics Exports With Legislation

BR1402122994 Paris ELECTRONIQUE INTERNATIONAL HEBDO in French 10 Feb p6

[Article by D.G.: "Parliament Wishes to Support European Electronics"]

[Text] To avoid European dependence on others in the field of electronics (the term "electronics" is used here to cover electronics for the general public, components, measures, manufacturers, telecommunications, information technology and office technology, automation, and software), the European Parliament has asked the Commission to improve its support for this sector of European industry. In the report, a company is considered to be European if it manufactures, undertakes research and development in Europe, and makes decisions concerning the above two activities in Europe.

Through its 18 January resolution, the European Parliament gives its unconditional support to Europe's electronics industry. The draft resolution is submitted by the European Parliament to the Commission. It is a statement of intent, which the Commission may use. However, the Parliament is only consulted over electronics—it is not party to decisionmaking. It thus calls upon the Commission to use all the means at its disposal to assist European electronics exports to Japan and the United States. In particular, in view of the difficulties in penetrating the U.S. and Japanese public markets, the European Parliament suggests "systematically including a reciprocity rule in Community legislation" so as to offset the lack of European protectionism in public markets. In the same spirit, it asks the Commission to negotiate fair competition with the European Union's trading partners, including stabilization of currencies and exchange rates, in addition to respect for the rules of the International Labor Office, and for international regulations over the environment.

The Parliament also invites the Commission to work with the Council of the European Union to draft two notices before 1 January 1995. The first notice will apparently concern the conclusion of "agreements similar to the U.S.-Japanese agreement on semiconductors," or of "an 'electronic' agreement similar to the 'automobile' agreement with Japan." The second notice seems likely to concern the establishment of Community protection measures.

Regarding components, so as to avoid dependence on a single non-European manufacturer, the Parliament's "statement of cause" (the "statement of cause" explains the reasons for the draft resolution; the resolution is what has been adopted by the European Parliament) suggests the establishment of a European participation fund to finance a part of the research dedicated to commercial purposes. This would enable "the strengthening of the technological and financial base of the European electronics industry."

In practical terms, through its draft resolution the European Parliament also demands aid for "cooperation over research and development for precompetitive and competitive innovations." It also asks the Commission to "strengthen and accelerate technological research efforts undertaken under the European research framework programs, and under the EUREKA initiative", and to give legal and financial assistance for "reconstruction and rationalization initiatives emanating from the private sector and aiming to improve adaptation to the global market." It gives its support to the possibility of creating European trusts capable of competing with the American, Japanese, and South Korean giants by insisting that the Commission should authorize mergers and cooperation whenever necessary for the survival of the European industry. In the same spirit, it calls for harmonization of technical standards, taking the GSM standard as an example.

Furthermore, it insists that the European Union should maintain "expertise in the development and implementation of pan-European networks for the exchange of data, so as to ensure its interoperability."

France: ESPRIT Project To Concentrate on Multichip Modules

BR1502112994 Paris ELECTRONIQUE INTERNATIONAL HEBDO in French 10 Feb 94 p26

[Article signed 'D.G.': "ESPRIT Tackles Multichip Modules"]

[Text] The European ESPRIT project is to devote two and a half years to developing multichip modules on ceramic and organic substrates. This subprogram, known as Chippac, is being managed by the Bull company.

The heads of the European ESPRIT research program have just entrusted the management of the Chippac microassembly program to Bull. This subprogram, to run

for two and a half years, is to use models to demonstrate the operational reliability of multichip modules (MCM) and single-chip modules (SCM) designed on the basis of the results of several previous studies of substrates and modes of connection. Other European companies will also participate in this project, notably Framatome, GEC Marconi UK, IMC, Alcatel-Mietic, SGS-Thomson, and Telefonica. The results of Chippac will have to be suitable for use in applications as varied as information technology, telecommunications, robotics, transport, or even for the general public. Participants in the Chippac project will initially concentrate on several basic studies of modules, starting with the problem of the reliability of bare chips. In particular, Chippac will seek to develop testing methods and tools to enable the quality of bare chips to be guaranteed before their assembly on the module (KGD: known good die). Two further studies will concentrate on ceramic (particularly low-temperature cosinters) and organic substrates, with the aim of comparing different kinds of products, and determining the limits and rules for their design.

A Thorough Study Based on Ball Bearings

Chippac will also look into modes of interconnection of bare chips (known as "first level of connection"). Wire connection up to 75fm and by TAB without bossing onto the chip (connection on the strip being by means of the pins of the chip) will be particularly investigated. The second level of connection (assembly of the module on the card) will also be investigated in a study dedicated particularly to ball bearings. The aims of Chippac are also concerned with the characteristics of modules. The SCM model will have to be able to encapsulate a 15 x 15 mm chip comprising over 400 E/S, operating at over 100 MHz and dissipating up to 10W. The module will need to be sufficiently reliable to be suitable for information technology and telecommunications applications. One of the MCM modules on a ceramic substrate (MCM-C) will need to contain 32 chips, including 24 bare ones (connected by TAB without bossing), and 8 encapsulated in ultraflat cases (TSOP). The external connections will need to operate at up to 33 Mbit/s, and the internal ones at up to 75 Mbit/s. The desired dissipation level is between 100 and 200 W. This configuration will also be tested on a MCM-L model (organic substrate). Another MCM-C model will use flip-chip technology to connect a 9-memory microprocessor. Finally, a MCM-L model needing to operate at around 1.5 GHz in very severe environmental conditions will also be tested.

Germany: DLR Director Interviewed

MI1502113194 Bonn DIE WELT in German 31 Jan 94 p 7

[Interview with Professor Walter Kroell, head of the German Aerospace Research Institute (DLR), by Norbert Lossau, place and date not specified: "Farewell to Space? That Would Make the Crisis More Acute"; first paragraph is DIE WELT introduction]

[Text] Professor Walter Kroell (55), head of the German Aerospace Research Institute in Cologne, sees a hazard for the German economy in the mass layoffs occurring in the aerospace industry: "These are the jobs of the future. If they are lost, there will be a severe problem," he says in this WELT interview. "The public does not yet realize that both key technologies and the means for securing our very existence are at stake." Norbert Lossau spoke to Walter Kroell.

[Lossau] Mass layoffs are occurring in the German aerospace industry. What do you see as the cause of this trend?

[Kroell] The aerospace industry is in fact in a very critical situation. In the aviation sector this is a result of excess capacity. A ruthless price war is being waged. Contracts are being canceled, and capacity is thus not fully taken up, even in successful firms, such as the European Airbus. A second factor is the drastic cut in military contracts as a result of worldwide detente, which from all other points of view can only be welcomed. The critical situation in the space sector results largely from the fact that—pursuant to ESA [European Space Agency] Council of Ministers decisions—capacities built up over a fairly long period must now be significantly cut back. The development program for the European Hermes space plane was canceled in 1993; the "free-flier" planned under the Columbus program had been given up even before that. All we are left with is the debate on the role of a dock-on laboratory module for an international space station. The financial, political, and programming framework lacks stability and continuity.

[Lossau] So, first and foremost, you identify the instability of political conditions as the root cause of the German space industry's weakness.

[Kroell] It is true that the political situation is difficult: Priorities have to be set. In the ultimate analysis, however, the issue is: What priority is to be assigned to research and technology in general, and to aerospace research and technology in particular, with a view to safeguarding the German economy?

[Lossau] How important is the aerospace industry to the German economy?

[Kroell] If you look at the United States, Japan, or even South Korea, Taiwan, or Indonesia, you will see that these countries' state programs pronounce aerospace research and technology to be key technologies of the future and draw the logical conclusions. NASA's aviation research budget, for instance, rose by 30 percent from 1992 to 1994.

[Lossau] Why is space a future technology?

[Kroell] Because many problems can only be solved with help from the aerospace sector. Aerospace's contribution to solving traffic, environment, climate, and energy problems will be indispensable. Satellites are needed for weather forecasting and international crisis management; the development of satellite communications will continue; satellite-based navigation and mobile telephony are areas whose significance is constantly increasing.

[Lossau] So are we missing out on a major technology while other countries are investing in it?

(Kroell] We are indeed running the risk of losing our ability to compete and collaborate in these major fields. Other European countries, too, Italy and Spain for instance, face particular financial problems that are having repercussions on their space sector commitments, but, generally speaking, space is regarded as a particularly significant area of technology in Europe.

[Lossau] Why is it that aerospace enjoys particularly high status in France?

[Kroell] Germany currently spends about 1.8 billion German marks [DM] a year on space, whereas France spends nearly DM3.2 billion. It enjoys higher status in France because aviation and space are widely recognized there as technologies of the future. Moreover, the French regard aviation and space as matters of national identity, an attitude completely alien to Germany. Here, the tendency is rather to set things in motion, to reach a high standard, maybe even a leading position, and then to keep casting doubt on them. Perhaps this is a feature of the German mentality.

[Lossau] Are we more hostile to technology than the French?

[Kroell] No. I believe that the value that German public opinion sets on aerospace is at the crux of the matter. The general public does not yet realize that both key technologies and the means for securing our very existence are at stake. If we want to withstand international competition in the aerospace sector, we need continuity, persistence, and stable long-term framework conditions, financial conditions included: Rather more modest figures if necessary, provided they remain stable in the longer term.

[Lossau] Is Germany losing jobs with future prospects while other countries, such as France, are setting long-term safeguards on them?

[Kroell] Jobs in the aerospace sector are jobs with a high-technology orientation and prospects for the future. If we cut them back while other countries, primarily the United States and countries in southeast Asia, are creating them, we shall face serious problems in the future. Generally speaking, I believe it can be said that we shall only render the crisis more acute in the future if we cut back on research and technology posts in the present situation.

Know-How for Americans and Russians

[Lossau] The reaction to every funding cut has always been: In that case, we shall only do so much; even that is still good research. Have the space sector's prestige and effectiveness suffered from this attitude too?

[Kroell] It undoubtedly detracts from the space sector's image. Both the man in the street and the technical expert look for tangible results. They rightly expect that once things have been initiated in a climate of consensus, they should be brought to a proper and speedy conclusion. Constantly adjusting or revising plans gives a bad impression. Of course, the space community can only spend the money that it actually receives. If money that is promised, for developing Hermes, for instance, is subsequently not forthcoming, the blame should not be laid at the door of the space sector.

[Lossau] Are there areas of aerospace in which Germany enjoys a technological lead?

[Kroell] Yes, several. The DLR and its German partners are the undisputed world leaders in space robotics. We have received interesting offers for the use of our know-how in future American and Russian projects. The DLR is also a leader, and an internationally sought-after partner, in teleoperation and telemanipulation. Another of our strong points lies in sensor, camera, and radar scanner development, a concrete example being the Mars cameras to be used on a Russian mission to Mars. The Americans, too, acknowledge the lead that this technology has gained.

[Lossau] You mention robotics. Are we actually so far ahead of the Americans in this field that they would have preferred to prevent the German Rotex robot from flying the D2 mission by setting particularly high requirements for it in terms of spaceworthiness?

[Kroell] Rotex has not only caused a sensation but has given rise to some concern in both the United States and Japan. There is no question about it: The Americans themselves admit to concern that Germany manifestly has its nose out in front in this important field of technology, the use of automation and robotics in space.

[Lossau] Hence the attempt to prevent space trials with the German robot?

[Kroell] I can confirm that the Americans set extremely high spaceworthiness requirements for Rotex and that it was difficult to demonstrate that it met them. But we succeeded. I cannot say that the Americans set greater hurdles on purpose.

[Lossau] When the German D2 astronauts visited Houston, I had the feeling that they were merely regarded as the Americans' junior partners.

[Kroell] The Americans and Russians are undoubtedly the leading space nations. NASA has an incomparably greater wealth of experience than we do, indeed it spends on quite a different scale. To this extent I find it understandable that the DLR was regarded as a junior partner on the shuttle flights. But the lesser partner's achievements have earned the Americans' high regard, not only for our astronauts' competence and professionalism but for the DLR Space Center's operational handling in Oberpfaffenhofen. However, it would not be realistic for us to claim to be a partner of equal weight and equal importance to the Americans and Russians, especially as far as manned missions are concerned.

New Tasks Waiting for Ariane-5

[Lossau] In 1993, the Europeans, and consequently the Germans as well, were taken by surprise by an agreement between the Americans and Russians to operate a space station together, whereas there had been plans for years previously for a joint space station with the Europeans. How do you see this turn of events?

[Kroell] It would undoubtedly have been desirable and proper to give the Europeans earlier notice of these discussions. But one never knows when agreements of this type may come about during discussions at top political level in the midst of many other, perhaps weightier topics. At the moment, it indeed looks as though we shall arrive at a joint European, American, and Russian project. This joint space effort can only be welcomed, and indeed it is what Germany has always been calling for. So, although the approach itself may leave something to be desired, everything points to Europe and Germany having a share in the space station.

[Lossau] ESA's latest plans envisage a manned space capsule, to be launched into space with an Ariane rocket. Is this the first step toward independence from the Americans?

[Kroell] I believe Europe must make a major point of incorporating the Ariane rocket into the overall concept of a space station of the type we have mentioned and using it as a transport vehicle. However, if we want to do this, we must consider whether the transfer vehicles should be manned or unmanned. I think it would therefore be useful at this point to carry out studies to examine whether and with what modifications Ariane-5 can be used to serve the space station. The manned capsule is one of the options that we can study in terms of any advantages that it might offer, its technical feasibility, and its financeability.

[Lossau] When is the earliest we can expect a decision?

[Kroell] Not before the end of 1995.

[Lossau] How much less than Hermes will it cost to develop this capsule?

[Kroell] That I do not know. This is one of the aspects that the planned studies set out to clarify: What should a capsule of this type look like in detail? What would it cost? How does it fit into the international scenario? These are questions that require intensive study. In any case, the capsule would have to cost substantially less than Hermes, otherwise it would not be a realistic alternative.

[Lossau] The politicians are the ones who set your finance framework ...

[Kroell] Correct. As I have said, the important thing is medium-term stability, even if the finance framework turns out to be more modest than originally anticipated. Then we shall have to see which priorities can be met within that framework. One thing is clear: With significantly less money we cannot achieve the initial targets, otherwise it would mean that the targets had not been defined in serious terms.

Data From Space Slumbering in Archives

[Lossau] Back to Ariane, whose image emerged from the spectacular false start somewhat battered: How seriously do you take the danger of its success being completely undermined by cheaper competition from Russia, China, or Japan?

[Kroell] The risk is real, especially in the absence of fair international competitive conditions. If there were a real open market with all the competitors enjoying equal opportunities, without "political prices," I should not be worried about Ariane.

[Lossau] But rockets—just like CD-players—can be produced more cheaply in countries with low wage levels.

[Kroell] There is no mass production for low-wage countries to date in the aerospace industry. Russia is a low-wage country, but just look at the hosts of people who, I grant you, work for low individual wages but, taken together, make for high overall costs. CD-players are a different matter: The international market and competition are open. There is no open market in rocket technology, nor do I see how one could come into being in the near future. If the Russians or Chinese say: Whatever the Western price is, we shall deliver rockets 20 or 30 percent more cheaply, the price is not the result of low payroll costs but of political calculation.

[Lossau] But the United States has already purchased some cheap flights from the Russians and even from the Chinese.

[Kroell] Not only the United States. If things are allowed to continue much further in this direction, with transport capacity being purchased wherever it is cheapest—just think of the Russians' massive excess capacity—Ariane will find it difficult to compete.

[Lossau] Can this issue only be settled at the political level?

[Kroell] Yes. Framework agreements on the subject and quota arrangements are being negotiated.

[Lossau] Apart from Rotex, can you give other examples to illustrate the significance of the manned D2 mission?

[Kroell] Another outstanding example is the DLR-designed Moms camera. During the mission, over 7 million square kilometers of the earth were photographed in exceptional quality. Most of the material and life science experiments performed during the mission are still being evaluated, but a number of excellent results are emerging here too.

[Lossau] What will the Moms photographs be used for?

[Kroell] They are stereoscopic images with high resolution to just a few meters. First and foremost, these images are immensely useful for cartography, especially for parts of the world that are not readily accessible or are completely inaccessible. They also show vegetation cover very clearly, distinguishing between bush, grassland, and cereal farming areas, and they identify the water collecting areas in karstic regions. They are also useful when undertaking three-dimensional terrain reconstructions.

[Lossau] A practically unmeasurable amount of data has been beamed to earth by satellites or brought back by manned space missions. The vast bulk of this data is slumbering unused on magnetic tapes. Does this not rather shake the credibility of claims that there is a constant need to collect more data?

[Kroell] The problem, and the challenge, here is to broaden the base using the wealth of information from space. The fact that this data has not yet been used to the desired

extent by no means renders it worthless. It rather calls for greater efforts to organize use of the data more effectively.

[Lossau] Is the fact that most of this data is lying unused in the archives attributable to lack of money or lack of interest on the part of researchers?

[Kroell] There are potential users who do not have the money, and there are others who have not yet realized that there is massive potential to be tapped here. What we need to do is activate and organize the user community. The DLR receives the data collected by all the main and, in the future, eastern civil satellites, and can process it according to user requirements. The problem is the end-use of this data. Money is needed to solve this problem.

It Would Be Dangerous To Break the Thread

[Lossau] In Germany we do not hear much about the use of satellites for verification purposes. Is there not major work to be done in this field in the future?

[Kroell] Undoubtedly. Our Defense Ministry has not yet gone in for space activities, but I am convinced that the potential for peacekeeping and crisis management from space will acquire increasing importance and that we, too, cannot afford to deny ourselves access to this potential in a context of international cooperation.

[Lossau] In future there will be less money available for manned space missions. Do you merely put this down to straightened finances, or has the need for research capacity in space declined as well?

[Kroell] Straightened finances, primarily, and also a resetting of priorities within this financial framework. There will be no national manned space projects in the foreseeable future, and this is fully in line with the desire for internationalization. We must therefore adjust our capability in this area accordingly. I believe it is a good thing to set space priorities in the environment and earth observation sphere and in particular technologies, such as robotics and telecommunications, regardless of budget size. However, I would also regard completely discontinuing work on manned space flight as fatal. We would run the risk of losing our hard-won competence as international partners. Losing our competence in aerospace research and technology would break the thread in a major field, it would mean giving up a strategically important area of research and technology, and it would consequently have a detrimental effect on the German economy.

[Lossau] Despite the general crisis and shifting of priorities away from manned space flight, do you believe man will actually fly to Mars?

[Kroell] This is without doubt an issue that will not be accorded top priority over the next few decades. At the moment there are more pressing problems for the space sector to help solve. Mars missions are thus not one of our foremost interests or concerns. However, I have no doubt that one day—albeit not in our time—such missions will become a reality.

International Affairs: SPRINT Program Extended Through December 1994

BR0802111094 Didcot INTERFACE EUROPE in English Jan 94 pp10-11

[Unattributed article: "EC Research, Education, and Training Programme News"]

[Text] SPRINT—Strategic Programme for Innovation and Technology Transfer. The Council has officially decided to extend the above programme until December 31st 1994—it was due to run from 1989 to 1993. The Council envisages the future integration of SPRINT into the Fourth Framework Programme for RTD. SPRINT's 'Lines of Action' have also been amended. Briefly these are:

Networks

1. Strengthening Intra-EC Networks for innovation

—consolidating and developing existing networks, particularly those involving technology and innovation management consultants, sectoral collective research centres, and innovative financing institutions;

—the formation of new networks, particularly between contract-research organisations, engineering consultants, quality and value-analysis specialists, etc.

—strengthening intra EC cooperation between research/industry and university/industry interfaces, and between technopoles and science parks;

2. Network Support Measures

—information actions of various kinds across national frontiers and between regions, in close liaison with the COMETT [Community Program for Education and Teaching in the Field of Technology] programme;

—enhancing the effectiveness of networks, inter alia by visits and professional exchanges, enhancing the transnational impact of technology exhibitions, identifying 'best practice' with respect to technology transfer, and through specific measures to help less favoured regions to participate in intra-EC networks;

—the launching of innovations emerging from networks by improving the dialogue between sources of funding, technical experts and innovators identified by the networks.

Support for Specific Projects

These include:

—encouraging the application of generic technologies to target industrial sectors in the less favoured regions or in regions of industrial decline;

—heightening awareness of these technologies and helping to train companies adopting them, emphasising the transnational element;

—providing technical support for companies, especially SMEs, potentially able to use these technologies, through technology transfer networks and advanced-technology centres;

Twin approaches can be followed:

1) identifying technologies suitable for widespread adoption in regions of lagging development or industrial decline, and promoting the use of these technologies in the sectors concerned;

2) identifying a need common to a group of companies in a given sector or region where the companies are prepared to finance the solution. This encourages the identification and possible adaptation of available technologies to deal with the need detected.

The planned projects shall act as a catalyst, and must also:

—be model projects in that they employ a comprehensive 'systemic' approach to the introduction of technological change, covering, for example, management, training, industrial design, and market assessment;

—provide an optimum combination of skills across frontiers and between regions and partners of differing special skills;

—involve industrial sectors or technologies chosen to guarantee a significant economic impact;

—help to reduce regional disparities in the availability of technologies;

—be based as far as possible on existing infrastructures;

—include provision for follow-up and evaluation, based in particular on stated and readily verifiable quantitative aims;

—ensure feedback of the experience gained; preferably directly by the companies benefiting from the scheme, in order to maximise the multiplier effect.

Improving the Understanding of the Process of Innovation

—Monitoring innovation in Europe (European Innovation Monitoring System) and evaluation of support measures;

—Strengthening concertation and the exchange of experience between Member States and the Commission in the field of innovation policy and technology transfer.

A second Annex outlines a budget for the SPRINT programme (1989-94), allowing expenditure of Ecu 41.5m for strengthening networks, Ecu 20m for accompanying measures, Ecu 34m for specific projects for intra-community innovation transfer, and Ecu 13.5m for monitoring innovation and concertation between the Member States. Total budget, Ecu 109m.

Germany: Max Planck Society Opens Institute for Infectious Diseases

MI1002154394 Bonn TECHNOLOGIE-NACHRICHTEN MANAGEMENT-INFORMATIONEN in German 27 Dec 93 p 7

[Text] The new Max Planck Institute of the Biology of Infection is due to begin work in the eastern part of Berlin at the beginning of 1994 and to move into new premises close to the Charite in 1998 at the latest. The establishment of this institute is regarded as a rare scientific opportunity to devote appropriate attention to this area, which is of importance in terms of both basic research and medical practice.

A third of all fatalities in the world can be traced to diseases caused by microbial pathogens. One and a half billion people—primarily in the third world, suffer from the 19 infectious diseases (excluding AIDS), for which American doctors consider new vaccines must be developed as a matter of priority.

The methods used in molecular and cytobiology, immunology, epidemiology, and structural chemistry now make it possible to arrive at a better understanding of the biology of the infection process and, consequently, at new approaches to the prevention and treatment of infectious diseases. Research into the biology of infection has thus increased considerably worldwide, although, apart from exceptions such as virus-dependent infectious diseases, it has not yet attained an internationally competitive level in Germany.

With the founding of a Max Planck Institute of the Biology of Infection to carry out multidisciplinary research the MPG [Max Planck Society] has taken a decisive step toward establishing this field in the Federal Republic of Germany.

By the time the institute is complete, it will comprise four departments:

—Immunology (headed by Professor Stefan E.A. Kaufmann), which will primarily study the interactions between immune systems and microbial pathogens, with particular reference to defensive and pathogenic mechanisms;

—Molecular Genetics, which will work on the molecular basis of the pathogenesis of infectious diseases and identify and analyze the factors responsible for virulence;

—Cytobiology, which will focus primarily on the invasion of host cells by microbes and on topics relating to intracellular proliferation and cell-to-cell spreading. Methods provided by cytobiology, electron microscopy, and biochemistry will be used to study communication between pathogen and host cell;

—Epidemiology, which will set out to identify virulence and resistance characteristics relevant to the spread of infectious diseases and to study microecosystems involved in infectious diseases.

The plan from the outset is to include clinical research as an integral part of the institute's overall approach and to recruit clinicians specializing in infectious diseases to work with research teams. Programs of research into infectious diseases in developing countries will also be drawn up and undertaken either in collaboration with the research laboratories already established in the countries concerned or by setting up field stations there. It is also planned to

extend the institute's scientific range by establishing independent teams of young scientists to work on topics that complement the research undertaken in the institute's own departments.

Germany: Final Decision on Transrapid To Be Made in March

MI0202105194 Bonn DIE WELT in German 21 Jan 94 p 1

[Article by Martin S. Lambeck: "Wissmann: Decision on Transrapid in March"]

[Text] The Federal Cabinet will decide at the end of March this year whether or not to build the Transrapid fast maglev line between Berlin and Hamburg, Federal Transport Minister Matthias Wissmann (CDU [Christian Democratic Union]) has told DIE WELT. He also said that he intended to introduce the maglev railway bill in the Bundestag before the end of the current parliamentary term. The coalition parties approve of the project, so it may safely be assumed that the bill will be passed.

"I want work on building the Transrapid to begin within three or four years," said Wissmann. If the high-technology line were built in 1997 and 1998, it could enter service between 2002 and 2004. The idea was to bring the train into the centers of both cities on Bundesbahn tracks. Wissmann expects the Transrapid and the work associated with it to create about 10,000 new jobs: "The Transrapid is a symbol of our capacity not only to develop advanced technology in Germany but to apply it for all to see," said the minister.

In view of mounting interest in the supertrain on the world markets, he said, it was particularly important for the Transrapid actually to run between Germany's capital and its second-largest city. No time should therefore be wasted. "Interest is mounting abroad. We currently have about five years' technological lead over the Japanese with the Transrapid," the minister reported. The Transrapid can reach a top speed of over 400 kilometers per hour and would complete the 285-km journey in under an hour. Track costs are currently put at 5.6 billion German marks [DM], and the fare is estimated at DM90 to 100.

Germany: Institute for Polymer Research Inaugurated in Dresden

MI0202105394 Bonn TECHNOLOGIE-NACHRICHTEN MANAGEMENT-INFORMATIONEN in German 15 Dec 93 pp 6-7

[Text] The Dresden Institute of Polymer Research (IPF) was opened on 6 December by Secretary of State to the BMFT [Federal Ministry of Research and Technology] Dr. Gebhard Ziller and the Science Minister of the Free State of Saxony, Professor Hans-Joachim Meyer. As one of the "Blue List" institutes, it is financed half by the BMFT and half by the Free State of Saxony (annual budget for 1993: 26.3 million German marks). With its 232 employees, the institute is one of the largest and most productive polymer research facilities in the Federal Republic of Germany.

The institute's work focuses primarily on application-oriented basic research, major fields being:

—polymer synthesis and characterization;

—interface phenomena in polymers and multiphase systems containing polymer matrix (with particular reference to polymer blends and reinforced polymers);

—polymer surface modification; and

—shaping, processing, and inspection of polymeric materials.

The institute is already working with numerous firms in the plastics, automotive, and lacquer industries, mainly on the development of environment-friendly lacquers for automobile bodies. It is also working jointly with AKZO AG on the further development of dialysis membranes for artificial kidneys and the monitoring of their production.

Professor Hans-Joerg Jacobasch, a scientist of international renown, was appointed scientific director of the Institute of Polymer Research, thus acknowledging the value of his work to date as head of the IPF in a commissary capacity.

Germany: Professor Warnecke Chairs Fraunhofer Society

MI0202110494 Bonn TECHNOLOGIE-NACHRICHTEN MANAGEMENT-INFORMATIONEN in German 30 Nov 93 pp 12-13

[Text] During the induction of Professor Hans-Juergen Warnecke as the new chairman of the Fraunhofer Society (FhG), Federal Research Minister Dr. Paul Krueger acknowledged the work of the outgoing chairman, Professor Max Syrbe, in an address given before leading representatives of the scientific, industrial, and political spheres. His chairmanship had consciously oriented the FhG toward entrepreneurial goals. The FhG's mission as the link between science and industry was of growing importance. In the FhG, Germany had a successful model for breaking down barriers between its roles as a scientific country and an industrial country.

The FhG was thus making a major contribution to raising the productivity of the German economy. The rapid conversion of outstanding basic research findings into products on markets was a priority aspect of research and technology policy in the Federal Republic for the coming years.

A glance at the FhG's business trend gives impressive evidence of its success: The number of institutes rose from 15 in 1965 to the current figure of nearly 50. Its overall budget rose from 20 million German marks [DM] in 1965 to the current sum of nearly DM1 billion. The FhG now faces the task of consolidating and building on this business success over the coming years. This will mean raising the industrial earnings share of the FhG's overall budget above the current figure of about DM200 million.

The FhG has made a considerable contribution to the creation of a unified research scene in Germany since 1989. The Federal Government welcomes the decision

that the FhG Senate took on 27 October 1993 to make 16 of the total of 22 Fraunhofer institutes and regional branches in the new federal laender eligible for funding on an indefinite basis at this early date, thus safeguarding over 1,000 permanent research and development posts.

The FhG facilities in the new federal laender fully lived up to the expectations placed in them in 1992. With 22 percent of earnings, they exceeded the 15 percent target assigned to them by a long chalk. The institutes scored a great success with the acquisition of project funds totaling approximately DM24 million, primarily from the Federal Government but in part from the governments of the new laender as well. Their high rate of participation in joint projects shows that these facilities are capable of holding their own against competition from their western counterparts as well. The Fraunhofer facilities' performance of DFG [German Research Association] projects and participation in special research programs in particular also provided proof of their scientific quality.

The Fraunhofer facilities were also successful in obtaining contracts from private industry: Of their overall contract earnings totaling DM14 million, two-thirds came from western companies and one-third from firms in the new federal laender. The Fraunhofer facilities have become a major factor in the R&D infrastructure in the new laender, where they are contributing to reconstruction.

Netherlands: State Funding for Applied Research Center Drops

BR0302091494 Zoetermeer WETENSCHAPSBELEID in Dutch 6 Dec 93 p 5

[Text] The reduction to the base funding of the TNO [Applied Netherlands Research Center] will, to a large extent, no longer be implemented. The TNO's subsidy from the Ministry of Science and Education originally was supposed to have been reduced from one percent in 1994 to five percent in 1998. The one percent reduction slated for 1994 will be implemented. However, State Secretary Cohen is willing to look for other financial means to offset the reduced subsidies slated for 1995 to 1998 as follows: 1995, 1.335 million guilders (G); 1996, G2.671 million; 1997, G4.006 million; and 1998, G5.342 million.

All of this was communicated in the annual subsidy letter, which explains the base subsidies as well as the target subsidies the TNO receives from different departments. The reduction was the result of a cabinet decision to diminish the number of subsidies. During the budget negotiations, the second Chamber made it clear that in this case the effect—less investment in knowledge infrastructure—would differ from the goal—a reduction in subsidies.

French Research Minister Quizzed on Policy

BR0402115094 Paris LE FIGARO in French 2 Feb 94 p10

[Interview with French Higher Education and Research Minister Francois Fillon by Jean-Paul Croize; date, place not given: "Research Seeks To Take a Deep Breath"; first paragraph is LE FIGARO introduction]

[Text] Society, in its determination to develop, must do more to exploit the opportunities offered by science: Investing in research seems essential if France is to enhance its potential in coping with economic and industrial developments on both a European and a global scale, especially if we finally manage to better "marry" our researchers and our companies. These are the three key findings of the "Report on the Trends of the Major Aims of French Research" presented yesterday by Robert Daulray, High Commissioner for Atomic Energy, to Francois Fillon, Minister of Higher Education and Research. This document, running to some 60 pages and commissioned last September by the minister, will now be circulated to around 30,000 people, who will use it as the basis for a "major national consultation" launched today by Francois Fillon.

This consultation exercise, based also on six thematic seminars to be held in different regions between now and mid-March, will be synthesized in a national debate on 9 April; this will be followed by the drafting during May of the final summative document, which will be used as the framework for parliamentary discussion on the future of French research, scheduled by the minister for the end of the spring session of the National Assembly, next June. Replying to our questions, he explains why he considers it "indispensable" to take the pulse of the French scientific community, so as to help it reach the end of the century in good shape.

[LE FIGARO] Why undertake such national consultation on the aims of research now?

[FILLON] Firstly, because this has not been done for 10 years, despite the major changes which have taken place since then in our society and in research. At the geopolitical level, take the disintegration of the former USSR, or, at the global level, the importance now attached to environmental problems. Take, also, the very rapid growth in the numbers of students, who should be considered not only in terms of their interests and abilities, but also in terms of the constraints of the labor market, without neglecting the research role of our universities.

Next, I feel it is important for France to have a more accurate perception of its scientific resources, and of the major steps it can and must take during the next few years, for the same reason as the United States, Japan, Germany, or indeed Britain.

[LE FIGARO] What should be the role of the state in scientific research?

[FILLON] My main criticism of French policy in this area over the past five years is the fact that we have not managed to define strong priorities—for pump-priming programs suitable for stimulating research in a changed national and international context; for launching basic research programs today, not only to prepare the applied research which tomorrow's companies will need, but also to respond to advances in this same applied research.

The state is presently going too far in reducing its essential role to allocating funding which is growing ever larger, but which unfortunately is increasingly absorbed by major

research bodies, rather than by research activities themselves. I believe it is time we found the way to target our research—with all the consultation that requires, of course—instead of being satisfied just to finance it, while having nothing, or virtually nothing, to say about it. Neither is it normal—the research establishments themselves complain about this—for the state to be unable to take selective decisions on supporting a particular laboratory which has just achieved a major breakthrough in a field which is becoming highly significant for our country...

Building Bridges Between Laboratories

[LE FIGARO] The preliminary report which launched this consultation refers to inflexibility over basic research. What is the cause of this, and how can it be cured?

[FILLON] Though it has not yet reached paralysis, we can certainly speak of disturbing inflexibility. Its symptoms are varied: Inability properly to assess needs, or difficulty in properly allocating efforts over the medium term, leading to difficulty in developing...

What causes this? The cause lies, once again, in the difficulties faced by institutions in properly developing their programs. Another cause is the doubts facing researchers, and, more generally, laboratories, over their ability to question, and, if necessary, abandon existing activities. It is also worth mentioning the problem faced by French researchers in finding the right level in particular fields, such as the "new frontier" which now is as much at the level of the infinitely complex as of the infinitely large or small. It seems that there are not enough bridges between laboratories where interdisciplinary research is concerned, such as—to take a specific example— global climate change. What do we do? This national consultation should analyze present modes of operation, and, hopefully, result in the basis for solutions.

A Very Longstanding Deficit

The preliminary report which launched this consultation refers to serious causes: For example, high-school education, which is claimed to favor the abstract at the expense of the concrete. We shall also have to look into problems which have been discussed for a long time: The insufficient mobility of researchers, their reluctance to take advantage of their job security so as to take risks, or even the lack of pump-priming funding, such as invitations to bid, for example.

[LE FIGARO] How does our private-sector research compare with that of other industrial countries?

[FILLON] It is common knowledge that far less is achieved here in France than in the other major industrial countries. Where German companies provide 72 percent of research and development, French companies manage only 60 percent.

We suffer from a very longstanding deficit, linked to the organization of our outmoded industrial structures. Many small and medium-sized enterprises [SME's] have problems in gaining access to research. There is little contact between the public and private sectors over research. It is obvious that France needs to increase its private-sector research—this was a matter of concern to my predecessors. I hope that this national consultation will reveal new solutions in three directions: Firstly, in developing modern tools, particularly through ANVAR, the National Agency for the Promotion of Research; then, in progressively fostering a research culture in many companies where it does not presently exist; and finally, in achieving a better understanding of the needs of our industries on the part of our research establishments.

[LE FIGARO] How can we enable applied research better to service SME's?

[FILLON] This can only be achieved through collective action, by the state, the private sector and local communities. For example, take the improvements in procedures for aiding research and innovation, again through such bodies as ANVAR, the creation or the strengthening of skills in companies—by hiring engineers with greater awareness of the scope offered by research to develop an activity—and the growing cooperation between these companies and technical education.

I believe that the interweaving of research activities and the needs of SME's must take place on a regional scale. The relationship between the two can be far more firmly established, on a person to person basis, so that needs and potential for development are in harmony.

German Government Increases Funds for R&D in New Laender

MI2601133694 Bonn DIE WELT in German 13 Jan 94 p 11

[Article by Heinz Heck: "Krueger: Funding Is Showing Results—Bonn Provides Several Hundred Million Marks To Boost Research in East"]

[Text] Although the cutbacks in the research and development (R&D) work force in the new federal laender have slowed down over the last year or two, they have not yet stopped altogether. Research Minister Paul Krueger said before today's Bundestag research debate that the Federal Government would therefore "not relax its considerable commitment to R&D funding in industry in the new laender."

Krueger nevertheless rejected the claim by the Halle Economic Research Institute (IWH) that the R&D work force had been cut from 86,000 to 10,000 between 1989 and the end of 1993 and that another 3,000 jobs were expected to be lost: His ministry could not agree with these figures. The terms of the comparison with an estimated 86,000 employees in the former GDR were not proper, as the figure of 10,000 referred solely to industry in the strict sense, whereas that of 86,000 took in the whole of the economy.

Krueger did not expect further heavy cuts in R&D jobs: "On the contrary, the funding programs are showing results, and the R&D work force in industry in the new laender is receiving increasing support—over 50 percent—from state funding measures. The Federal Government

realized early on that maintaining and expanding a productive industrial research capability would require an exceptional commitment on the part of the state." The range of funding measures had thus been extended back at the beginning of 1992 and considerably more funds provided for industrial R&D in the new laender.

Krueger considered even greater efforts on the part of government and industry necessary to make up lost ground. Companies from the original laender were setting up research stations in the new ones, and this, together with the funding measures sponsored by his own ministry, the Industry Ministry, and the governments of the new laender, should have a stabilizing effect on staffing levels there. The two ministries had set aside 740 million German marks for 1994, and additional funds would be forthcoming from the new laender themselves.

Krueger saw a strong export trade aspect in this funding, as "R&D-intensive goods are a strong feature of German exports." These are goods in which R&D expenditure represents over 3.5 percent of the sale price. They gave Germany a considerable trade surplus each year, 48 percent of German industrial exports being R&D intensive (1992).

Numerous east German firms were still not internationally competitive with their products, so a greater orientation toward product innovation was required. Industry in the new laender would need support in developing products based on selected key technologies. "This will also contribute to stabilizing the R&D work force."

German Government Approves Construction of Transrapid

MI1301090394 Munich SUEDDEUTSCHE ZEITUNG in German 9 Dec 93 p 21

[Text] On Wednesday, the Federal Cabinet declared itself in favor of building the Transrapid magnetic levitation railway from Hamburg to Berlin on the basis of a new financing strategy submitted by industry. Speaking at a news conference held jointly with Research Minister Krueger (CDU [Christian Democratic Union]) in Bonn, Transport Minister Wissmann (CDU) stated that the Federal Government had "given a favorable reading" to the report, which envisages financing the 8.9-million German mark [DM] project overwhelmingly by private investment. The building go-ahead will be given by the end of March, and Federal Chancellor Kohl has made it known that he wants all matters of detail settled by the end of February.

Krueger and Wissman spoke of a "signal for Germany as a leading center of industry" and of a sign of the country's future viability. Magnetic levitation was power-saving, quiet, and safe; Germany, moreover, still had five to 10 years' lead over the United States and Japan in this technology. Building work on the line, on which Bonn had agreed back in 1992, is scheduled to begin in or around 1996, and trial operation in 2003 or 2004. It will run over a distance of 284 kilometers from Hamburg Central Station and Hamburg- Billwerder Moorfleet to Berlin via Schwerin and Spandau. Journey time will be just under one hour, with a train leaving in each direction every 10 minutes. Wissmann said that the ticket price could not yet be specified, as it would depend on the amount of custom attracted. Krueger said that, at today's fare levels, an "indicative" fare of DM90 to 100 was likely. The project will create at least 10,000 jobs overall, 4,000 of them in the structural steel engineering industry alone.

Wissmann said that the decisive factor in obtaining the Federal Government's agreement had been the industry's new financing strategy, which envisaged a substantially higher contribution on the part of industry than the initial plan, submitted in March. According to the new proposals, track ownership and operation would be kept strictly separate, the Federal Government taking responsibility for the track and the operating company being organized on private lines. In addition to the main parties involved, which are Daimler-Benz/AEG, Siemens, Thyssen Industries, the Deutsche Bank, and the Investment Bank for Reconstruction, the plan is for the shareholders to include insurance companies and the Dyckerhoff & Widmann, Hochtief, and Philipp Holzmann construction firms. Industry, banks, and private investors will contribute DM1.2 billion in venture capital, and the Bundesbahn and Lufthansa will each put up DM150 million. The industry proposes a 20 percent tax preference for private investors along Berlin loan lines, as no dividend can be expected for many years. In addition to the DM1.5- billion shareholders' equity, loans to the tune of DM3.3 billion will be obtained. Third-party funds will be refinanced solely out of profits, without state guarantees.

The Federal Government is to bear the investment costs for the track, which will amount to approximately DM5.6 billion, although industry is offering to contribute: The operating company is offering to pay the track company the interest and repayment installments on loans totaling DM2.4 billion out of the track rental fee, after which the Federal Government would be directly liable for only DM3.2 billion. Winfriend Haastert, board chairman of Thyssen Industries AG Henschel, stated that building an ICE [intercity express] line between Hamburg and Berlin would cost more than the Transrapid line.

Coalition deputies such as Kurt Faltlhauser (CSU [Christian Social Union]), Christian Lenzer (CDU), and Horst Friedrich (FDP [Free Democratic Party of Germany]) spoke in support of the plan and called for rapid implementation. SPD [Social Democratic Party of Germany] industry spokesman Uwe Jens welcomed the project as well. SPD deputies Michael Mueller and Siegrun Klemmer, however, were against the "Transrapid adventure," suggesting that the billions would be better spent modernizing the railways.

Germany: Max Planck Society Expands in New Laender

MI1901141594 Munich MPG SPIEGEL in German 15 Nov 93 pp 31-34

[Article by Dr. Andreas Trepte of the General Administration of the Max Planck Society: "On the Road Toward a Single Research Scene"; first paragraph is MPG SPIEGEL introduction]

[Text] Three years after German unification, the Max Planck Society feels that the time has come to review its achievements in the new federal laender and, where necessary, to adjust its funding policy for the accession area to take account of developments to date. This funding policy is based on a program drawn up by the society's governing bodies in the late fall of 1990 and comprising (as summarized below) two components or—to put it simply—a priority program devised to implement fast-acting measures and a long-term program envisaging the founding of Max Planck institutes.

The strategy underlying the funding policy that the Max-Planck Society adopted for the new federal laender in 1990 may be summarized as follows:

1. Priority program designed to enhance university research, comprising:

   —funding of joint research undertaken with scientists from the new federal laender (1990-1992), and

   —establishment of:

   a) teams;

   b) local branches of institutes; and

   c) centers for the humanities (1991-1997).

2. Long-term program envisaging the founding of Max Planck institutes in the new federal laender.

Enhancing University Research

From 1990 to 1992, the priority program was mainly used to help establish contacts and initial joint research projects between scientists from the new federal laender and scientists at the Max Planck institutes. In parallel with these initiatives, a total of 28 temporary teams were set up at seven universities in the course of 1992 as a means of helping enhance basic research there. The building modernizations needed by these teams are being completed in 1993, so all the teams will now be able to make full use of their newly refurbished premises and accommodation. The host universities have meanwhile appointed 20 team leaders, while the appointment procedure for six more leading scientists is at an advanced stage and is expected to be completed before the end of 1993. There have been delays with two teams, one due to the introduction of integrity review [Integritaetspruefung] procedures at east German universities and the other to the prospective leader's appointment to another university. The people concerned at the universities and ministries, the Max Planck Society, and the Max Planck institutes sponsoring the two teams in question are working on solutions to the problems that these delays are creating and hope to come up with alternatives by the end of the current year.

Preservation of Existing Research Capabilities

The Science Council's recommendations that two local branches of existing Max Planck institutes be set up and seven centers for the humanities be established and sponsored over a limited period as a contribution to the reorganization of research in the former GDR gave an additional boost to the Max Planck Society's priority program in 1991.

The local branches of the Max Planck institutes of Plasma Physics and Extraterrestrial Physics began work on 1 January 1992.

In 1992, the Max Planck Society, via its "New Scientific Project Funding Corporation Limited," which it founded in 1991, began establishing seven research centers for the humanities, recruiting the requisite staff, and arranging accommodation and providing administrative facilities for them, pursuant to the Science Council's recommendation. This work was successfully completed by spring 1993. The drafting of recommendations as to the conceptional configuration and institutional organization of these centers has also been completed by a committee appointed by the chairman of the Max Planck Society. After the Max Planck Society's senate had noted these recommendations in June 1993, they were passed on to the Science Council so that it could express a final opinion on them sufficiently in advance of the beginning of the Max Planck Society subsidiary's trusteeship of the centers. It is now a pressing concern to all involved that a decision be made as early as possible as regards the future development prospects of the centers and that measures be taken accordingly.

The Max Planck Society's long-term program was also enlarged as a result of Science Council recommendations that two Max Planck institutes be set up in the light of its assessment of non-university research in the former GDR: the Max Planck institutes of Microstructure Physics and Colloid and Interface Research. As with the recommendations regarding the priority program, two major concerns in this case as well have been to prevent the disintegration of viable research capabilities, though without perpetuating the old structures, and to dismantle excess capacities which cannot be funded albeit without destroying long-standing working relationships. It was therefore necessary not only to formulate new scientific strategies, but to restructure the research work itself and to draft in scientists from other organizations. Seven scientists from Germany and abroad have been appointed as directors for the top positions at the two Max Planck institutes.

Aspirations and Obstacles

Since the start of German unification, it has been the Max Planck Society's desire that its specific facilities should contribute to the creation of a single research scene in the united Germany. Under its long-term program, it therefore began, even before the end of 1990, to discuss, select, and plan projects for founding institutes to cover topics that would effectively enhance the research scene in the new laender and at the same time boost the research capability of the united Germany as a whole. The individual elements and the implementation schedule up to the summer of 1993 are set out below.

Implementation of the Max Planck Society's Program to Set Up Research Facilities in the New Federal Laender (1991-1993)

1. Priority Program

   1991: Founding of 28 teams, two local branches of institutes, and seven humanities centers;

   1992: Creating working facilities required for 28 teams, two local branches of institutes, and seven humanities centers.

2. Long-Term Program

   1991: Decisions to found two MPI's*

   —Microstructure Physics; and

   —Colloid and Interface Research.

   1992: Implementation of the 1991 decisions;

   Decisions to found four MPI's:

   —Biology of Infection;

   —Plant Physiology;

   —Economic Systems; and

   —Physics of Complex Systems.

   Discussion of further projects to found institutes.

   1993: Decision to found one MPI:

   —History of Science.

   Implementation of the 1992/1993 decisions.

   Discussion of further projects to found institutes:

   —Neuropsychology;

   —Theoretical Biology;

   —Peptide Binding;

   —Physics of Gravitation; and

   —Research on the Enlightenment [Aufklaerungsforschung]** * [Max Planck institutes] ** The Max Planck Society committee concerned currently sees no possibility of implementing this project as a Max Planck institute.

The long-term program is based on an awareness that research priorities in the new federal laender cannot merely be deduced from the existing capabilities there but also require strategies that take account of the recent and latest developments in science and research at the international level.

To this end, the scientific members of the Max Planck Society submitted a total of 25 proposals for projects in 1990, 11 of which were finally selected according to science policy criteria and thoroughly discussed and assessed. The scientific discussions on five projects reached a positive conclusion in spring 1993—with the Max Planck Society's senate deciding to found an institute in each case.

However, for a considerable time it could not be predicted whether the federal and land governments would be prepared to finance further Max Planck Society institutes in the new laender to the level envisaged in the society's plans. Indeed, in 1992 all the signs pointed to the Society having to make do with only a very tight financial framework far below its budget requirements.

The senate of the Max Planck Society thus found itself forced, in June 1992, to make the implementation of its decisions to found further Max Planck institutes in the new laender subject to a special financing reservation. The Max Planck Society had originally intended to begin setting up the majority of its newly founded institutes at the end of 1992, and to decide on their locations accordingly. However, the funds available under the society's budget for 1993 and the Federal Government's middle-term budget appropriations for the Max Planck Society in the accession area did not provide an adequate basis on which to proceed.

Then, in August 1992—when consideration of the 1994 budget was imminent—the Max Planck Society formerly asked the Federal Government and the heads of government of the original and new federal laender to create the conditions required to implement its program. This request aimed to obtain a consensus among the funding authorities both as to the timeframe within which the goal of as even as possible a distribution of Max Planck institutes in the united Germany could be achieved and as to the increase in funding that this would require over the following five years.

Being unable to wait for a reply from the federal and land governments, the Max Planck Society decided immediately, in November 1992, to proceed with the implementation of at least some of the decisions to found institutes, thus running a considerable risk. In November 1992, the senate accordingly decided to go ahead and set up a Max Planck Institute of the Biology of Infection and a Max Planck Institute of Research into Economic Systems and to enter into negotiations with the two host laender concerned.

Over the following months it became increasingly clear, particularly in the chairman's talks with the minister-presidents of the new laender and the Federal Minister of Research and Technology, that the governments of the new laender were in agreement with the Max Planck Society's program for setting up research facilities in the accession area and were prepared to give active support to its plans. For its part, the BMFT [Federal Ministry of Research and Technology] announced an appreciable rise in its budget appropriations for the Max Planck Society's work in the new federal laender commencing 1994.

Further Institutes Founded and Initial Recruitment Talks Held

It was these two parallel developments, the positive reaction of the heads of government of the new laender and the Federal Government's revised plans, that made it possible, in March 1993, for the Max Planck Society's senate to present the plans to date for the locations of the institutes

on which decisions had already been made and the options available for the locations of those still under discussion. Following this senate meeting, a start was made on implementing the decisions to found institutes that had been set aside until then, i.e.:

—the Max Planck Institute of Molecular Plant Physiology in the Potsdam area;

—the Max Planck Institute of the Physics of Complex Systems in Dresden, and

—the Max Planck Institute of the History of Science in Berlin.

This cleared the way for recruitment talks with all the directors-designate and targeted negotiations with the prospective host laender so that matters such as premises for the institutes and each institute's integration into the local scientific scene could be settled rapidly and by common accord.

Provided the negotiations with the future host laender can be brought to a positive conclusion in good time and the directors- designate accept the appointments offered to them, these five institutes will be able to begin work before the end of the current year, or at the latest in the first half of next year. Together with its two existing institutes, the Max Planck Society will then have seven institutes in the new federal laender and the eastern part of Berlin.

Plans for Five More Research Facilities

Five more research institutes are already in an extremely advanced stage of scientific planning and, subject to the outcome of scientific discussions at the end of 1994, a start could be made with setting them up in the course of 1995 at the latest. These institute foundation projects cover:

—the physics of gravitation;

—theoretical biology;

—neuropsychology research;

—enzymology of peptide binding (Footnote 1), and

—research on the European Enlightenment (Footnote 2).

A clear picture already exists as to the location of most of these facilities from the point of view of local scientific scene and appropriate regional distribution: The European Enlightenment and enzymology of peptide binding projects would probably be located in Halle and a Max Planck Institute of the Physics of Gravitation in Potsdam. Locational conditions appropriate for the planned Max Planck Institute of Neuropsychology Research have been identified in both Leipzig and Magdeburg, and the two cities are currently being considered by the committee concerned. The committee in charge of the projected Max Planck Institute of Theoretical Biology will consider two alternative host cities: Rostock and Jena.

Regional Distribution in the New Federal Laender

The following regional distribution options are currently being considered for the two existing, five developing, and five planned Max Planck Society projects:

Berlin

—Biology of Infection and

—History of Science. Brandenburg

—Colloid and Interface Research;

—Molecular Plant Physiology, and

—Physics of Gravitation,

all in the Potsdam area. Mecklenburg-Western Pomerania

—Theoretical Biology

in Rostock (alternative to Jena/Thuringia). Saxony

—Physics of Complex Systems

in Dresden, and

—Neuropsychology

in Leipzig (alternative to Magdeburg/Saxony-Anhalt). Saxony-Anhalt

—Microstructure Physics

in Halle;

—Enzymology of Peptide Binding

in Halle, and

—Neuropsychology

in Magdeburg (alternative to Leipzig/Saxony). Thuringia

—Research into Economic Systems

in Jena and

—Theoretical Biology

in Jena (alternative to Rostock/Mecklenburg)

According to current plans, the Max Planck Society will be represented in the new federal laender and the eastern part of Berlin from 1995 onwards with a maximum of 12 and a minimum of 10 institutes.

Footnotes 1. Solutions other than the founding of an institute are also being discussed for this facility. 2. The Max Planck Society committee concerned currently sees no possibility of implementing this project in the form of a Max Planck institute. However, the final decision will be made by the section concerned or, if appropriate, by the senate of the Max Planck Society at its October and November meetings this year.

1993 Interim Report

The stage reached by September 1993 in discussing, founding, and setting up Max Planck Society [MPG] research institutes in the new funding area is summarized below.

Max Planck Society's Work in the New Federal Laender and Berlin, Status: September 1993

I. Facilities Founded Further to Max Planck Society Planning:

Teams at Universities:

A. Humboldt University, Berlin:

—Structural Grammar;

—Algebraic Geometry, Number Theory;

—X Ray Diffraction on Coating Systems;

—Nonconventional Radiation;

—Quantum Chemistry;

—Cell Division Regulation and Gene Substitution;

—Transformation Processes in the New Laender;

—Theory of Low-Dimension Semiconductors.

B. University of Potsdam:

—Error Tolerant Computing;

—Nonlinear Dynamics in Astrophysics;

—Estate Ownership East of River Elbe;

—Partial Differential Equations and Complex Analysis.

C. University of Rostock:

—Theoretical Multiparticle Systems;

—Complex Catalysis;

—Asymmetrical Catalysis.

D. Technical University of Dresden:

—Theory of Complex Electron Systems;

—Mechanics of Heterogeneous Solid Bodies.

E. University of Leipzig:

—Time Resolution Spectroscopy.

F. University of Halle-Wittenberg:

—Enzymology of Peptide Binding;

—Environment Law;

—Liquid-Crystal Systems.

G. University of Jena:

—CO2 Chemistry;

—X Ray Optics;

—Dust in Star Formation Areas;

—Theory of Gravitation;

—Molecular and Cellular Physiology;

—Pharmacological Hemostaseology;

—Signal Transmission by Growth Factors.

II. Facilities Founded Further to Science Council Recommendations:

A. Max Planck Institute of Microstructure Physics.

B. Max Planck Institute of Colloid and Interface Research.

C. Berlin Branch of Max Planck Institute of Plasma Physics.

D. Berlin Branch of Max Planck Institute of Extraterrestrial Physics.

E. Centers for Humanities Research (sponsored by the New Scientific Project Funding Corporation Limited):

—Historical Studies;

—History and Theory of Science;

—Research into the European Enlightenment;

—Modern Middle Eastern Research;

—General Linguistics, Speech Typology, and Linguistic Universals Research;

—Literary Research;

—History and Culture of Central, Eastern Europe.

III. Further Projects under Scientific Discussion:

—Physics of Gravitation;

—Theoretical Biology;

—Neuropsychology Research;

—Enzymology of Peptide Binding;

—European Enlightenment.

IV. Senate Decisions to Found Following Projects Taken:

—Max Planck Institute of the Biology of Infection;

—Max Planck Institute of Molecular Plant Physiology;

—Max Planck Institute of Research into Economic Systems;

—Max Planck Institute of the Physics of Complex Systems;

—Max Planck Institute of the History of Science.

However, the locations established to date and those still under consideration for the institutes envisaged so far are not yet sufficient to achieve the Max Planck Society's goal of proportionate regional presence in the accession area.

One of the main reasons behind this initial lack of balance is that the local scientific scenes, which are essential for productive Max Planck institutes [MPIs], differ widely in the individual laender. The Max Planck Society is nevertheless confident that its current plans to found further institutes in the new federal laender will bring it sufficiently close to achieving the desired balance in the distribution of its research facilities to keep the gap between the relative advantages and drawbacks of the individual laender, which is also seen in the original federal laender, within limits in the end result.

The Max Planck Society's future planning for the new federal laender is based on the long-term program that it drew up in 1990 alongside its priority program. In it, the Max Planck Society identified its long-term goal as focusing on funding basic research in institutes of its own in the new laender as well. It was and remains the Max Planck Society's concern to contribute to the creation of a single research scene in the united Germany by gradually founding a relatively large number of institutes in the new laender. In concrete terms, for the Max Planck Society a single research scene means, firstly, being represented on the same scale, proportionally speaking, in the new and original federal laender and, secondly, countering the danger of a transfer of finance away from the new and toward the original laender, as threatened from 1995, when research will be funded on an overall basis. If it is to achieve both these goals, the society will need to have 15 to 20 institutes in the new laender by the turn of the century.

Planning Principles and Special Features

To enable it to meet these targets, the Max Planck Society has set in motion a complex, ongoing procedure for discussing, founding, and building up new institutes. This procedure is based on the special role performed by the Max Planck Society within Germany's widely differentiated system of institutionalized research and comprises the following principles:

—The Max Planck Society's domain is that of basic research, where it complements university research. It consequently relies on the existence of productive, broadly diversified university research (principle of subsidiarity);

—The Max Planck Society supports basic research in areas holding out particular promise for the future but which the universities have not yet (adequately) taken up or which they cannot (adequately) cover (principle of emerging fields);

—In order to fulfill its purpose, the Max Planck Society needs top scientists with a particular aptitude for leading its institutes (Harnack principle).

The Max Planck Society's procedure for discussing, founding, and setting up new research facilities, which involves a large number of outside experts, begins with the examination of proposals to found institutes and the selection of the most suitable topics according to a number of overriding criteria. This is followed by a survey of the stage reached in international research in the discipline concerned. The next steps in the procedure are to draw up and discuss the research strategy, to seek suitable candidates, and so on down to identifying the best location and acquiring equipment and premises for the future institute.

The founding of a Max Planck institute [MPI] has enormous consequences in institutional and staffing terms. It is not merely a matter of dignifying this or that research topic but of tying up financial resources and staff over an indefinite period. Last but not least, the working lives of top researchers are diverted to the facility. The preparatory procedure involved in founding an institute thus takes time, as it has to be extremely thorough in view of:

—The financial implications inherent in the establishment of permanent institutes;

—The time that it takes to set up the institute; and

—The conditions necessary for the successful appointment of scientists at the forefront of the international field in their subjects.

The very principles on which this procedure is based tend to place limits on its success from within owing to:

—The particular nature of the research topics, which means that, out of the whole range of supraregional nonuniversity research funding available, they require the specific facilities provided only by the Max Planck Society; and

—The limited availability of top scientists suited to leading a Max Planck institute.

External constraints to which the procedure is subject depend firstly on the readiness of the federal and land governments to put up the funds needed to implement the institute projects given a positive assessment in this process. Other limits depend on the finite nature of the logistic capabilities that the Max Planck Society has at its disposal for setting up and administering new research facilities.

Continuous Implementation of Institute Founding Projects

The Max Planck Society set its process for discussing the founding of institutes in the new federal laender in motion back in 1990, and it has produced the following results to date:

—In 1991, the Max Planck institutes of Microstructure Physics (1) and Colloid and Interface Research (2) were founded following discussion of the Science Council's recommendations to this effect;

—In 1992, the MPG decided to found four more Max Planck institutes of, respectively, the Biology of Infection (3), Molecular Plant Physiology (4), Research into Economic Systems (5), and the Physics of Complex Systems (6);

—In 1993, it was decided to found the Max Planck Institute of the History of Science (7); and

—Decisions to found five more institutes are expected in fall 1993 or the first half of 1994.

It was not until spring 1993, however, that the federal and land governments found themselves in a position to bring their budget priorities more closely into line with the Max Planck Society's institute founding work and to let the society know that it could now count on full support for the implementation of its long-term program in the new federal laender. Since June 1993, the Max Planck Society has received enough hints to assume that the federal and land governments will provide the funds needed to achieve its overall goal, which is for its coverage of the new laender to be similar to its presence in the original federal area. Since February 1993, the Max Planck Society's committees have been continuing the selection and discussion process with a view to founding further institutes in the new laender, in the expectation that it will be possible to implement their decisions.

In order to be represented in the new laender by 15 to 20 institutes by the turn of the century, the Max Planck Society hopes to found up to eight more institutes in the new federal area over the next few years in addition to those already existing and those now being set up or about to emerge from the discussion procedure. The Max Planck Society is relying on the federal and land governments' promise to provide the requisite funds for these plans, which will now assume concrete form, as well.

In order to meet the target of eight more institutes, the scientific members of the society have been asked to submit additional proposals for them, if possible by the end of November 1993. Spring 1994 will then see the beginning of specific discussions on the individual projects in the three sections of the Max Planck Society. As set out in box 3, the society plans to set up two institutes a year if possible between 1995 and 1999 in a continuous succession of planning and founding.

Implementation of the Max Planck Society's Program to Set Up Research Facilities in the New Federal Laender (1994-200)

1. Priority Program

   1994-1997: funding of teams and local institute branches, preparations for institutionalization of humanities centers;

   1998-2000: integration of teams into host universities.

2. Long-Term Program

   1994-2000: implementation of 1992/1993 decisions to found institutes, decisions to found projects discussed in 1993 and their implementation; discussion, founding, and setting up of further MPI's

Difficulties Encountered When Founding Institutes

The Max Planck Society has always encountered specific difficulties when founding new institutes. Even the planning process itself runs a constant risk of foundering on account of the particular commitments that have to be entered into on such occasions. Moreover, it is the society's political counterparts who, by allocating funds or by deciding in favor of other priorities, create the conditions in which a project can be implemented or otherwise. In addition, our experience over the last two years has shown how much more difficult it is to set up institutes in the new laender, both because of the many matters of science policy and infrastructure planning that remain to be settled there, from the structure of higher education down to the problems caused by the building land and housing market, and because of the specific—objective and subjective—difficulty that leading scientists may encounter in deciding to settle permanently with their families in the new federal laender. These various factors mean that the possibility of individual projects foundering in the new laender can never be ruled out, and the number of Max Planck Society commissions appointed to examine and draw up proposals for new institutes in 1994 will therefore be rather higher than the eight new institutes actually contemplated.

The committees' work will be arranged in such a way as to consider the issue of the choice of location for the projected institute as early as possible. The Science Council's recommendations as to the development of relevant research areas and programs at east German universities will be taken into account, as will any of the laender's and universities' plans that have now taken a more concrete form; systematic contacts with research and structural advisory bodies at the land ministries and talks with university colleagues from the disciplines concerned will gradually make it clear where appropriate conditions for the research work to be performed at the planned institute are to be found or may be expected within the foreseeable future, and where the institute can make a particular contribution to university research. The intention is that this procedure will bring the principle of subsidiarity to university research to bear in a manner appropriate to the specific situation of research in the new laender—as is already the case with the Max Planck Society teams established at universities.

Dialogue With the Federal and Land Governments

The Max Planck Society is already reporting regularly to the Federal-Land Commission on its progress in meeting its planning target of up to 20 institutes in the new laender and its middle-term financial planning at the annual round of budget negotiations. In the summer of 1993, the chairman of the Max Planck Society and the Federal Minister of Research and Technology also discussed plans for the Max Planck Society and the federal and land governments to confer regularly on the status reached in the planning of further Max Planck institutes and the financial requirements that they entail. An ongoing dialogue of this type would also enable the federal and land governments to adopt the financial measures required to implement the stage reached in the society's planning process at an early date.

As mentioned above, the Max Planck Society's target is not merely to achieve an adequate presence throughout the Federal Republic but to distribute the society's research capability fairly among the new federal laender. However, this goal of a single, coherent research scene cannot be achieved until the whole establishment process has been accomplished. On the contrary, the individual steps in this process will constantly create fresh imbalances, although they will only be temporary, and for this reason the Max

Planck Society hopes to establish an intensive dialogue concerning close, trusting collaboration with the new laender themselves so that the intermediate steps can be accepted in their inevitable imbalance as a means to the end of a generally balanced, albeit not mathematically equal, distribution of the Max Planck institutes throughout the new federal laender.

Workshop Document on Industrial Research in Eastern Germany Published

Halle DOKUMENTATION ZUM WORKSHOP in German May 92 pp 25-26

[Final Report on Workshop on Industrial Research for Economic Development in the New German Laender, held in Suhl on 8-9 April 1992, organized by Fraunhofer Institute (FhG-ISI)]]

[Excerpt]

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Final Document

Within the framework of a research contract from the Federal Ministry of Economics, the Fraunhofer Institute for Systems Technology and Innovation Research, Karlsruhe, and the Institute for Economic Research, Halle, Berlin Office, organized a hearing on 8 and 9 April 1992 in Suhl/Thuringia on the survival problems of industrial research establishments in the new laender. More than 30 experts from the economic sector, research and politics from the entire FRG took part.

The participants expressed themselves very openly, with criticism and constructiveness, and as complicating conditions for restructuring the eastern German research landscape they mentioned:

- the slim market for research and development work;
- the great uncertainty about the economic development, which could last another five to seven years;
- the barriers to entering the market, which many eastern German enterprises must overcome against the established competition.

The participants in the workshop agreed on the following recommendations:

1. Industrial research must be retained in its core sectors, or the process of reindustrialization will be even more delayed. Industrial research establishments in the new laender need conditions similar to those of the competing institutions in the old laender, meaning

- they need buildings, facilities and real estate;
- they must be relieved of old encumbrances and old loans;
- they have claims on equal treatment in the distribution of research contracts.

2. The governments of the new laender must recognize the major importance of applied research for the economic development. They should guarantee proportionate basic or fundamental financing for efficient R&D, in which activity they could be guided by the corresponding practice in the old laender.

3. It must be guaranteed that eastern German applicants are not discriminated against in evaluating project applications. At present, western Germans dominate in associations and on expert panels. The chances of experts from the new laender to have a say should be improved.

4. R&D enterprises need a secure financial base in order to fully utilize their scope for action. To this end the Trust Agency should contribute by transferring or conveying property. Rapid decisions are necessary, primarily for the so-called research companies.

5. Support for scientific and technical cooperation with Central and Eastern European countries could open up new demand for the output of eastern German research institutes.

6. The Working Group of Industrial Research Associations (AIF) should support activities to found new

research associations and their acceptance as members. The conditions used so far, which are particularly favorable for project contracts to R&D establishments in the new laender ("exemption from self-supplied funding"), should be retained until 1995.

7. The Trust Agency should to a greater extent supply the industrial R&D establishments with guaranteed liquidity credits.

Policies Proposed for Improving Eastern German Industrial Research

94WS0087B Karlsruhe FRAUNHOFER INSTITUT FUER SYSTEMTECHNIK UND INNOVATIONSFORSCHUNG in German Mar 93 pp 1-19

[Followup Document to Workshop on Industrial Research in Eastern Germany; produced by Fraunhofer Institute for Systems Technology and Innovation Research (FhG-ISI)]

[Text] This paper was generated in connection with the study "Industrial Research Establishments in the FRG With Special Consideration for Structural Adjustments in the New Laender," which was jointly carried out in 1991-93 by the Fraunhofer Institute for Systems Technology and Innovation Research (ISI), Karlsruhe, and the Institute for Economic Research Halle (IWH), Berlin, at the request of the Federal Ministry for Economics. The project leaders at ISI were Stefan Kuhlmann, Rainer Bierhals, Doris Holland, Guido Reger. Project leaders at IWH were Herbert Berteit, Eberhard Adam, Hans-Juergen Rauch, Susanne Roehnert.

The Double Challenge: Upheaval in Germany's Industrial Research Infrastructure—Requirements for Political Action

1. Upheaval in Germany's Industrial Research Infrastructure

Industrial research is an important element for a competitive, modern industry; it combines knowledge of basic research with the requirements of industrial production. Industrial research is therefore an essential part of the technological innovation capability in the economy.

The industrial research infrastructure in the united Germany today faces a double challenge:

Challenge 1: Industrial research needs a technical and functional adjustment to the altered tasks; this is a result of the progressive technological development and altered dynamic of the world market, which further reinforce the pressure for innovation in industry. First, new subject concentrations are emerging in research and technology, to which the industrial research establishments and government R&D funding measures must react. Second, it is becoming clear that industrial research institutions today, more than before, must be understood as active intermediaries in networks of various industrial partners and research establishments, and that in so doing basic research and application development must cooperate more closely than before—in local as well as globalized industrial connections.

Challenge 2: Simultaneously, an internal German adjustment of capacity and structure is necessary. As a result of the change in systems, industrial research in the new laender has lost its customers almost completely and is in total upheaval, and largely in dissolution as well. The sharp economic decline of the global economy, which now has also reached western German industry, further led to reduced utilization of western German industrial research as well. Despite the already completed downsizing in eastern Germany, the declining demand is today faced with a relatively large overall German supply potential for industrial research that lacks industrial contracts. To this is added a structural problem: Both research systems contributed similar strengths and weaknesses; today a heated, cutthroat competition is under way, in which eastern German suppliers are clearly finding poorer starting conditions.

In order to assure an overall German industrial landscape that is aimed at the future, is innovation-oriented and benefits industrial competitiveness, two urgent tasks must be mastered at the same time:

- In the short term: The creation of improved competitive conditions for the remaining industrial research establishments in eastern Germany—assuming that an approximately equal distribution between old and new laender is politically intended.
- In the medium term: A stocktaking, specific adjustment and further development of the entire German industrial research landscape.

The following part of the research report called "Industrial Research Establishments in the FRG With Special Consideration of Structural Adjustments in the New Laender" is meant as a contribution to the discussion of requirements for political action in this field. In the following the outlined discussions will be shown as having several steps.

The argumentation rests on results of the studies, carried out jointly by the Fraunhofer Institute for Systems Technology and Innovation Research (ISI) and the Institute for Economic Research Halle (IWH) in 1991/92 on this subject, which are documented in the other sections of the research report, and on assessments of newer results of innovation research.

2. Restructuring of Industrial Research: Elements of New Political Efforts

A debate on the future of industrial research in Germany must take the following aspects into account:

- Support for research and technology is a long-term investment and does not help overcome the current economic crisis.
- New technological concentrations and the increasing interlinking of technologies will mark industrial research services in the future.
- New functions of technical research and industrial innovation are developing.
- Regions need a mix of industrial research at the "middle" level of technology and a "wide range."

- Industrial research in eastern Germany needs preferential treatment in order to have a chance to adjust to the double structural change.
- A stocktaking and specific restructuring of the **entire** German industrial research landscape is necessary.

These aspects can only be briefly commented on in the following. A systematic analysis and the design of future structures for industrial research in Germany will require significantly greater efforts than were possible within the framework of this underlying study.

Support for Research and Technology Is a Long-Term Investment and Does not Serve to Overcome the Current Crisis

The discussions outlined here for the support of research and technology are not suitable for helping to overcome the double crisis of the German economy in the early 1990s, which consists of the basic adjustment crisis of eastern German industry and the current economic slump in the western German economy.

Strengthening the technological innovation capability of industry is a permanent task, whose results become effective only in the medium and long term. Planning horizons for stabilization, reorganization and expansion of the industrial research infrastructure must therefore have a perspective of at least five to ten years. The buildup of the existing infrastructure in the old laender took place over three decades before it reached its present size, and the establishments were able to assume their present functions in the scientific and industrial innovation system.

For the infrastructure plans for industrial research in the area of the new laender today this means—after an urgent, initial guarantee of a minimum potential in the upheaval phase of 1989/72, as was shown by the fate of many "research companies"—that the foreseeable requirements must be the determining ones at the end of our decade and in transition to the next millennium. These requirements cannot be exactly specified in advance, however, partly because the positions of the German economy in the world market in five years and later are uncertain, and partly because technological developments cannot be adequately assessed. However, we can indicate a few elements in the foreseeable shifts in concentration and altered function of industrial research in the coming years.

New Technological Concentrations and Their Increasing Interlinking

In the last few years the question of the potential development of science and technology is again being discussed and studied in leading industrial nations, above all in the United States and in Japan, as well as in Europe and in other OECD nations. A whole series of studies on evaluating the so-called critical technology fields for the medium-term future have now been published. They contain more or less extensive lists of technologies (for example the Commerce Department of the United States: "Emerging Technology: An Appraisal of the Technical and Economic Possibilities," 1990; "Report of the National Committee for Critical Technology" of the United States, 1991; Ministry of Economics of the Netherlands: "Experiment in Technology Forecasting," 1991; Economic Planning Agency, Japan: "Technology and Products in the Year 2010," 1992; Science and Technology Agency, Japan: "Future Technology in Japan," 1992). Such studies were produced with the general objective of being able to concentrate research activities and government followup measures to those areas of technology, where a decisive influence on the future problem-solving capability of the national economies in question is addressed. Such studies are also under way in Germany at this time (one with medium-term and one with long-term perspectives), which have not yet been concluded, however.

What information regarding the innovation process from medium and long-term perspectives, and thus for the tasks of industrial research, can be obtained from such studies, and what bottlenecks can be perceived? This is, of course a prognostic and synthetic question, to which there is no ultimate answer, founded on data.

In general terms, the innovation cycle can be sketched as that of "intelligent" technology. The universally cheap resource of petroleum in the postwar era is replaced by the universally cheap resource of the "chip."

In the discussion of bottlenecks, greater attention must be paid to the demand factors. Technology monitoring (and sometimes also technology policy) is tempted to limit itself to the description and consideration of the potential supply of natural science technology solutions and the institutions which offer them. Which technology and which research infrastructure will be important in the future depends to a great extent on the anticipated social, ecological and economic problem pressure, from which important demands on the science and technology of the future are formulated.

For the purpose of clear arrangement and description, it is possible to distinguish those fields of technology, which in all corresponding foreign studies are regarded as essential for the future innovation capability (a new assessment by the ISI and the project sponsor, the Federal Ministry for Research and Technology [BMFT], undertaken at the request of the BMFT, will soon appear):

- Advanced materials,
- manufacturing and production technologies,
- information technology and electronics,
- biotechnology,
- and, above all, technologies in their respective overlapping areas, such as microsystem technology, nanotechnology, molecular electronics.

Technology at the beginning of the 21st Century cannot be divided according to conventional aspects, however; this applies particularly to application areas. Applications such as future telecommunications result from progress in both microelectronics and photonics and are not conceivable without contributions from software development. This cooperation by technologies is not basically new, but is spreading more and more and now requires consequences for the research, technology and innovation policies. It must be studied whether the research infrastructure

(including the industrial one) and the existing research administration in Germany must be adapted to the objectively existing interlinking.

New Functions of Technological Research and Industrial Innovation Develop

The OECD recently stressed (as a result of its "Technology/Economy Program") the altered role of industrial research in the industrialized nations: As an "intermediary body," it will in the future not only provide the transfer of knowledge from research to industrial application, but must also feed back the requirements of industry to basic and long-term-oriented research. Beyond that, it will have to meet the—seemingly paradoxical—double challenge of being increasingly active "on the spot" in local technology-oriented networks as well as cooperate in "globalized" technology development contexts ("techno-globalism"), since the production of knowledge and innovations more and more frequently takes place in international connections.

This is the result of a structural change for technological innovations, which now no longer takes place in "new" technology fields (such as modern biotechnology), but on a broad front, and to which the industrial and industrially applied research in the new laender must also submit (see also Box 1). Michael Gibbons of the Science Policy Research Unit (SPRU) spectacularly called this supplementation, observed by many innovation researchers, of the innovation process by a second mode the "transition from mode 1 to mode 2 of the knowledge production:" Mode 1 describes a more traditional, "linear," discipline-bound, primarily internal (within a company or research institute) manner of producing technological innovation through "applied" research and development (which in certain fields will continue to be of importance); mode 2 describes a new form of science-based innovation processes, which overcomes the conventional separation of pure and applied research. Elements of the new form of science production are:

- Research in connection with application and application development with feedback to the research base,
- production of "transdisciplinary" knowledge,
- heterogeneous form of activities and participating actors,
- variety of organizational and institutional forms,
- immediate industrial utilization of the possibilities of new technical facilities and equipment in research,
- greater demands for quality and efficiency control.

To begin with, these are very general conclusions, which need more precise analysis and specification for individual fields of technology, research institutions and various industries. It is certain, however, that a view, organization and promotion of industrial research that is largely oriented toward traditional divisions of industrial branches, such as dominates traditional "joint industrial research," will no longer do justice to the interconnected character and "transdisciplinary quality" of increasingly science-linked innovation processes.

Box 1: Market Opportunities for Eastern German Industrial Research: Modern Technological Strategies Necessary.

In a market for industrial research in Germany, which is overcrowded in some fields and which furthermore is marked by a decrease in research contracts from the economy and restrained government support for industrial research, it is particularly difficult for these establishments and enterprises in the new laender to become permanently established: In view of the extremely unfavorable starting conditions (interrupted relations with former industrial partners, the lack of capital, uncertain property conditions, obsolete facilities, the danger of losing qualified personnel) they regard themselves as exposed to a fierce, cutthroat competition, although in part they are highly efficient and willing to achieve.

A future-oriented market strategy includes market analyses and operating systems, sufficient investments and long-term business strategies, particularly innovation and technology strategies. It is precisely in these areas that eastern German enterprises have major shortcomings. Short-term survival strategies (such as low-price policies) do not create any prospects. What is decisive is the correct positioning of one's own work with respect to the demands of technological innovations in industry—right now these are undergoing a radical process of change: World-market-capable products from a high-price economy such as the German (and other western European ones) will be even more technology-intensive in the future than in the past. The "technological intensity" of the products today increasingly also includes intelligent interconnection of technologies of very different origin; at the same time, more and more often knowledge from basic scientific research flows directly into the development process for new products (or methods).

The growing "interlinking of technology" and "science-basing" creates new challenges for industrial research and development; small and medium-sized enterprises, above all, thus end up under pressure to adjust and are looking for support. Industrial research establishments can provide help here and thus find a market, if they meet the following demands:

- **Technological interconnection.** Intelligent products require the combination of the most varied technologies; industrial research must visibly be able to practice interface management.
- **Interdisciplinary cooperation.** More than before, representatives of various disciplines in the engineering sciences, the natural sciences and technology management must be ready for and capable of cooperating.
- **Network orientation.** One enterprise is increasingly less able to offer all the know-how about technology-intensive products: Formal and informal cooperation between various partners (companies, research facilities, engineering bureaus, etc.) in technology networks becomes more important.
- **Simultaneous regional and global orientation.** Industry-related research needs strong roots in the regional research and industrial environment, but in the

respective field of expertise it must maintain active connections with leading worldwide developments, for instance through international research cooperations.

Regions Need a 'Mix' of Industrial Research at the 'Middle' Level of Technology and a 'Wide Range.'

The conclusions in the preceding step do not make regional potentials in industrial research at the "middle" technological level, which are frequently based more on the traditional, "linear," model, superfluous. Practical experience proves—and many innovation and regional research studies confirm—that they continue to form a stabilizing element in modern industrial structures, whose backbone are active, company-internal R&D potentials.

In the old laender such capacities have been built up over decades with massive use of public funding from the Federal Government and the laender; many of these research establishments today form the foundation for continued development toward "science-based" technological innovations.

Which "mix" of industrial research establishments from various fields of technology and with varying technological "range" is regionally or nationally necessary? It would take a great deal of expense systematically to compare, quantitatively and qualitatively, the existing infrastructure of industrial research in the old laender with the establishments in existence right now in eastern Germany, in order to draw conclusions for planning decisions; this expense could not be justified in the framework of the analyses undertaken for this report.

But just a glance at the industrial research infrastructure "mix" of an old land, which is very active in this respect, makes it clear how large the gap is that yawns between the situation there and the conditions in the new laender (see Box 2). The desire to build such an infrastructure from scratch in each of the eastern German laender would take an extraordinary effort.

Box 2: Industrial Research in the Old Laender—Example: Baden-Wuerttemberg

The beginnings of government support for industrial research in the region of the Land of Baden-Wuerttemberg go back far into the 19th Century. Today, the land (9.6 million inhabitants) counts the following among its industrial research establishments:

- 13 Fraunhofer Society institutes,
- 10 joint industrial research institutes,
- Eight contract research facilities at universities,
- Two large research establishments,
- about 100 transfer establishments of the Steinbeis Foundation (usually) at technical colleges.

These facilities are financed by research income (contract research, research funding) and by institutional funding from the Federal Government and the land (in proportions varying according to the institution).

The Fraunhofer Society institutes in Baden-Wuerttemberg (1,500 employees) work in the following fields of work, among others: Information technology, production automation, biomethod technology, energy technology, construction technology, sensor technology, materials. The budget of the Baden-Wuerttemberg institutes was DM 300 million in 1989, approximately one-third of which was financed on the basis of industrial cooperations.

Divided by industry, the joint industrial research establishments operate in the following fields: textile and process technology, clothing industry, textile chemistry, chemical fibers, tanning, pigments/paints, industrial glass, precision mechanics/watch technology, microtechnology, fine metals/metal chemistry, synthetics. The budget volume for these establishments was DM 46 million in 1989, DM 14 million of which were based on industrial cooperations.

The contract research institutes at the universities ("An institutes"), which have only been around for a few years in this form, are active in the following sectors: microelectronics, information science, natural sciences-medical research, laser technology in medicine, application-oriented knowledge processing, solar energy and hydrogen research, manufacturing technology. In 1989 the budget for these institutes was DM 49 million, DM 18 million of which came from cooperations with the business sector.

The large research establishments (Stuttgart Research Center of the Aerospace Research Institute, DLR, in the fields of materials, construction methods, energetics, and Karlsruhe Nuclear Research Center, KfK, in the fields of environmental technology, materials research, handling technology, microsystem technology, nuclear technology), earned about DM 30 million in income in 1989 through industrial cooperations (with a total budget of DM 780 million). In connection with the shrinking institutional support for these establishments from the federal government, they will make efforts over the next few years to expand their share of the contract research market.

The technical advisory services and transfer centers of the Steinbeis Foundation (founded in 1971), in the which professors and graduates from technical colleges in the region offer technological advice and development projects in the fields of flexible automation and production technology, process technology, electronics/microelectronics, software engineering and CAD/CAM, in 1989 earned more than 90 percent of their DM 65 million budget from industrial cooperations.

Industrial Research in Eastern Germany Needs Preferential Treatment in Order to Have a Chance to Adjust With the Double Structural Change

The collapse of industrial research in the new laender has already taken on dramatic proportions. Of the approximately 75,000 researchers active in industry at the beginning of 1990, at the present time—as reported by representative surveys at the beginning of October 1992—no more than 15,000 are left in the new laender. The number of industrial researchers in the new laender, compared to the old laender, has thus reached a ratio of 1:15. While in the old laender there are seven researchers for every 100 industry employees, in the new laender there is only one.

In addition, it must be taken into account that of the remaining R&D employees one in three works in a job creation position.

So far, it has not been possible to halt the decline of R&D potentials. An extensive inquiry among privatized research establishments and privatized enterprises gave the result that, from the end of 1991 until April 1992, a 25 percent decrease in R&D potential took place, and these companies feared an additional decrease by mid-1993 by up to 60 percent. In Trust Agency enterprises, as well, a more rapid drop in R&D employees than in general employees is taking place, as confirmed by reports from the Trust Agency itself.

About half of all industrial R&D employees in the new laender are still working in Trust Agency enterprises. Although the Trust Agency is trying to enforce preservation of the R&D potential when selling the companies, increasingly more buyers of industrial enterprises are refusing to take over R&D employees. The number of enterprises which function as "extended workbenches" for their mother companies, is growing.

The present development in industrial research runs counter to the desirable industrial buildup in the new laender. Where there is a lack of creative research there is also a lack of innovation, and where no innovations are being brought out there will also be little investment. Successful innovations presume immaterial investments and result in material replacement, rationalization, and expansion investments. For that reason R&D must not be regarded as a labor policy task, but as a necessary investment for the future.

Although basically an original task for the economy, the federal government and the laender agree that in view of the extent and the special problems of structural change in the economy in the new laender, the process of restructuring and reorganization and expansion of efficient R&D potentials must be accompanied by subsidies over a longer period through government measures. In this sense many attempts at economic and technology policy are being made to promote the innovation capability of eastern German enterprises. The BMWi [Federal Ministry for Economics] and the BMFT are making a large amount of funding available. But it is still not clear whether these subsidies will also be available in the medium term (three to five years) as a prerequisite for self-supporting reconstruction in the new laender.

In the future it will primarily be the laender which must bear special responsibility in this process. A glance at the abundance of existing subsidy measures being offered by the governments in the old laender (see Box 3) makes it clear how much eastern Germany still needs to catch up, although the governments in the new laender are apparently becoming active in this field, as was documented at another place in this study.

A research landscape is soon destroyed. Rebuilding it is many times more expensive than keeping it. For this reason it is proposed

- that research potentials be supported on site for a longer, but defined period of time. The research establishments need fundamental or basic financing (decreasing), since only a minor part of the overall costs can be financed from project support;
- that a gradually decreasing financial subsidy be assumed for the next three to five years for the enterprises still under Trust Agency management. Limiting the subsidy to enterprises with fewer than 1,000 employees is here counterproductive for maintaining the R&D potentials.
- that the subsidy rate in certain cases be increased to 80 percent for enterprises, which due to their limited financial opportunities cannot generate the required 50 percent of their own funding and for that reason cannot claim any subsidies;
- that equal starting conditions be created for eastern German industrial, independent, research establishments by conveying ownership of the movable goods as well as property needed for the business. In addition, cancellation of old debts and liquidation loans is indispensable.
- that the support of contract research from west to east (AWO) be expanded. Utilization of eastern German industrial research by companies in the processing industries in the old laender has been less than satisfactory until now. With exactly DM 50 million (as of August 1992), one can only speak of a beginning of support in awarding contracts to researchers in the new laender. Measured by the annual amounts given away by enterprises in the old laender to external research establishments, the above amount, at not quite one percent, is very low;
- that the equality of eastern German R&D facilities in competing for the granting of contracts be assured. To that end, more eastern German scientists should also sit on expert panels.

Box 3: Research and Technology Support Activities by the Old Laender (according to the BDI [Federal Association of German Industry] Handbook of Research and Innovation Support in 1992)

Baden-Wuerttemberg

- Economic support program—Focus on Technology Support
- The law on subsidizing medium-sized enterprises
- Technology consulting

Bavaria

- Technology consulting program
- Innovation support program
- Support for economic research
- Introduction to technology program
- Medium-sized enterprise credit program
- Program to support rational energy use
- Environmental technology support program
- New Materials research program

Berlin

- Industrial technology development
- Innovation fund
- Science-related technology research
- Support of R&D in small and medium-sized enterprises
- Technology consulting
- Innovation assistant

Bremen

- Joint R&D program
- R&D project program
- Innovation assistant
- Technical consulting service
- Medium-sized industry support program
- Work experience in innovation
- Acquisition cost subsidy program
- Researchers in Industry program
- Support for information and communications technologies

Hamburg

- Projects in the field of industrial research
- Innovation promotion program
- Media and communications technology support program
- Management assistant
- Support of R&D projects in the field of artificial intelligence

Hesse

- Technology and innovation consulting
- Rational and nonpolluting energy use
- Environmental technology program

Lower Saxony

- Support of R&D projects in the field of product and process innovation
- Inventor support
- Technology consulting
- Innovation assistant

North Rhine-Westphalia

- Technology Program Economy
- Technology consulting
- Technology Program Energy
- Technology Program Metallic Materials
- Future technologies program
- Innovation assistant
- Euro-assistant
- Work experience in innovation

Rhineland-Palatinate

- Support for economic research
- Innovation support program
- Technology consulting
- Technology introduction program
- Personnel transfer program, innovation assistant

Saarland

- Research and technology program
- Technology consulting
- Innovation support
- Innovation assistant

Schleswig-Holstein

- Support for product innovations
- Support for special consulting
- Support for inventions
- Support for innovation cooperations
- Support for market analyses and technology studies
- Introduction of new environmental technologies
- Support for economic research, development and technology transfer

Stocktaking and Specific Restructuring of the Entire German Industrial Research Landscape

In the old FRG a relatively differentiated system of industrial research had developed since the 1960s; important elements are the institutes for joint industrial research, the Fraunhofer Society institutes, the universities, the technical colleges and increasingly the major research establishments. In the former GDR industrial research was organized completely differently, but it also had—something which is crucial here—comparatively high-quality research resources, above all in human capital.

Today, more than two years after the German unification, the all-German industrial research is facing a challenge with respect to volume: The uncontrolled decline of industrial production in the new laender is accompanied by a continued cutback in industrial research in eastern Germany. The sharp economic slump in the global economy, which has now reached the western German industry as well, also causes a shrinking demand for the services of western Germany industrial research.

To this is added a structural problem: A comparison of technological specialization models in eastern and western Germany for the year immediately before the unification shows that both research systems demonstrate similar strengths and weaknesses, so that there were scarcely any positive complementary effects. On the contrary; a violent cutthroat competition began, in which eastern German workers clearly had the inferior starting conditions.

What could have happened even at the time of the German unification must take place now: The entire German industrial research infrastructure should be subjected to a thorough stocktaking

- on the demand side, meaning with a view to the foreseeable (as well as desirable with respect to industrial policy) industrial demand for research work,
- on the supply side, meaning with a view to existing and development-capable potentials,
- institutionally, meaning with a view to proven or obsolete financing, organization and cooperation models, respectively.

Since this has already in part been done as regards the eastern German infrastructure, this challenge applies particularly to the western German system. It should be

connected with the attempt to describe the entire German market for research and development services in terms of quantity as well (see Box 4).

Several reasons argue in favor of such a revision:

- Until now there has been no sufficiently detailed, in terms of quantity and quality, and at the same time clear picture of the entire German infrastructure of industrial research, but such an overview represents an indispensable foundation for planning and decisions in research and innovation policy.
- There are accumulating indications that the spending for research and technology development in Germany is stagnating or even declining. The public research budgets have grown disproportionately with the German unification, that is to say, in relative terms they have shrunk. Research spending by the economic sector hardly grew in real terms in the last three years—after high growth rates in the 1980s—and the number of employed research personnel in the old laender from 1989 to 1991 dropped by 2.9 percent a year (according to the Expert Report on Economic Statistics 1992). Under these conditions there is also a stagnation of external R&D spending by enterprises—and hence the field of action for industrial research.
- The system of government actors is fragmented; there is a lack of coordination between department politics and of a clear division of duties between regional, national and European R&D policies.
- There are scarcely any long-term and strategically designed guidelines, either in industry or in research and technology policy.
- The mobility between the subsystems of the research system (for example between industrial research, economic research, academic operation) and in international connections is insufficient.
- The politically offered incentive systems are now no longer sufficiently capable of adjustment or creative; it is felt that their concepts are no longer specific enough.

In the event the proposed extensive stocktaking of the business-oriented research system should finally lead to a reorganization, several factors are unavoidable:

- A restructuring of industrial research must take place with a view to the position and opportunities of German industry in the world market. In so doing, one must balance which weaknesses in the technological performance profile can realistically be overcome by the industry and by government support for industrial research, and which market sectors will remain unconquerable.
- The existing industrial structures and industrial concentrations in eastern and western Germany, insofar as they are competitive or harbor strong potential for future success, must be treated as constants in the decision about research infrastructures.
- The restructuring must treat German industrial research as a part of the larger infrastructure of the European Community and also with a view to Central and Eastern Europe.

It is of basic importance here that the state cannot "execute" this restructuring process but should primarily moderate and, during recognizable bottlenecks, provide support through institutional funding for necessary research facilities and time-limited subsidy programs.

Box 4: Development of the Market for Research and Development in the Old Laender

An exact description of the market for R&D services creates difficulties in several respects, which are mentioned elsewhere (see PROGNOS/ISI: "R&D Cooperations by Small and Medium-Sized Enterprises, Basel/Karlsruhe, 1991)." Including the new laender makes little sense, since the corresponding data are still incomplete and the dynamic of negative change continues to be strong (See Expert Report on Economic Statistics: "Research and Development in the Economy, Results and Assessments 1991-92").

The data available for the old laender show stagnation, after impressive growth in research spending in the economy in the 1980s and an absolutely and relatively significant growth in external research tasks since the beginning of the 1990s. This is undoubtedly a reflection of the slowdown in economic growth. Experience in innovation research ("interlocking technologies," "science-linking") allows for the assumption, however, that the proportion of external R&D spending (about 10 percent) reached today will no longer decrease but perhaps might even grow.

More precise analyses here show that the predominant part of external company spending flows not to government-supported research infrastructures but to other companies—a clear indication of the interconnection of industrial technology! As is well known, the entry into the R&D market is made easier for government-supported institutions through programs which offer financial support for cooperation between industry and science.

Under these framework conditions it cannot be anticipated that eastern German establishments should rapidly be able to capture, on their own, an appreciable share of the all-German R&D market.

France, Israel Renew S&T Ties

94WS0153A Paris AFP SCIENCES in French 25 Nov 93 pp 1, 2

[Article: "Strengthening of Franco-Israeli Scientific Cooperation"]

[Text] Jerusalem—France's minister for higher education and research, Mr. Francois Fillon, was in Israel 22-25 November to strengthen scientific and technical cooperation between the two countries. The trip also gave him the opportunity to make contact with Palestinian personalities and look at ways to increase aid in these fields to the populations of Gaza and Jericho.

Cooperation between the two countries was reviewed on 23 November, in Jerusalem, at the second meeting of the Franco-Israeli High Scientific Council, with Mr. Fillon and Mrs. Shulamit Aloni, the Israeli research minister, in attendance. Created in 1987, this body previously had met only once, in 1989.

"We want to participate in the building of peace in the Middle East," Mr. Fillon said at a press conference following the meeting. "We must take political progress into account and thus to consider cooperation in different modalities. There is every reason now to put obstacles of the past behind us. We are ready to participate in development of the (occupied) territories, in projects desired by the Palestinians. In our view, scientific and technical cooperation is indeed the foundation of peace and development." It can "efface differences in economic levels, reduce tension, and thus facilitate peace."

French and Israeli representatives agreed at the meeting to launch two new high-priority programs, in immunology and in basic research on composite materials; each project will be allotted a half-million dollars per year for a two-year period. Allocation of such large sums "demonstrates the commitment of our two governments to continue with the science and technology cooperation" which began many years ago and will now, according to Mr. Fillon, be "redoubled again." Both sides noted the "exemplary character and high quality" of Franco-Israeli cooperation.

The two new programs will be launched in the next few months. They were proposed by the scientists themselves because of their innovative character, the excellent scientific potential of the two countries in these domains, and lastly because, as the French minister put it, collaborative efforts by researchers from the two scientific communities in these fields "are very likely to yield positive results." Also discussed was the possibility of broadening the already good bilateral cooperation on health problems to include other Mediterranean basin countries. An initial meeting on the subject may be held next year.

On 24 November Mr. Fillon traveled to the Palestinian University of Bir-Zeit (about twenty kilometers from Jerusalem), which was closed by Israeli authorities from 1988 to 1992 because of the "Intifada" ("war of stones"). The visit of the French minister for higher education and research coincided, by chance, with the holding of Bir-Zeit's first student council elections. The president of that large university group, Mr. Hanna Nassir—a member of the Palestinian High Council, he was allowed to return to Bir-Zeit only last April—said he was delighted to have Mr. Fillon visit the campus "at such a decisive moment" for the "national development" of the Palestinian people.

"We know we can count on France, which has taught the world the true meaning of the word liberty," to furnish aid to the eight Palestinian universities, which have a combined enrollment of 20,000 students and a budget in the neighborhood of US$26 million. "France has always supported your right to control your own destiny," said Fillon. "We will continue to support that goal. I am here to tell you that the French Government is ready to cooperate with your universities, so that the system you have already begun building, under difficult circumstances, will be able to take on new dimensions."

"We are ready to support the Bir-Zeit juridical [education] center, the creation of a master's program in public administration, the training of administrative support personnel, the establishment of an autonomous Palestinian degree course—with instruction in the French language, of course—the expansion of education in technical fields, and to cooperate in research programs that correspond to your needs." And to engage in academic exchange programs. "As I see it," the minister added, "scientific and technological cooperation is a decisive factor for the establishment of a durable peace throughout the region."

During his visit to Israel, Mr. Fillon also held talks with Education Minister Amnon Rubinstein and Foreign Minister Shimon Peres.

30-Year Cooperation

Franco-Israeli cooperation in science, technology, higher education, and cultural affairs dates back more than 30 years. Launched in 1959 by a governmental cooperation accord, it has been in existence ever since, albeit subject to the vicissitudes of politics and the complexities entailed by the risk of knowledge transfer to a country that has very high scientific potential. Israel treats research as a "national priority" and in fact devotes to it three percent of gross domestic product [GDP], compared to 2.4 percent for France.

Scientific and technological cooperation is effected both through the Franco-Israeli Association for Scientific and Technological Research (AFIRST) and under the rubric of direct accords between French research bodies (CNRS [National Scientific Research Center], INSERM [National Institute of Health and Medical Research], INRA [National Institute of Agronomic Research], INRIA [National Institute for Research on Data Processing and Automation], the Pasteur Institute) and their Israeli counterparts (Weizmann Institute, Technion, Volcani Institute, etc.) or Israel's National Council for Research and Development (CNRD).

The commitment to strengthen cooperation was underlined by both sides during President Mitterrand's official visit to Israel in November 1992 and Mr. Yitzhak Rabin's visit to Paris last June. Since then, concurrently with the High Scientific Council, a High Council on Research and Industry was established; still under discussion is the proposed creation of a $250 million Binational Fund to finance basic research projects and the creation of industrial partnerships.

Frenchmen and Israelis are cooperating in such varied fields as life sciences, mathematics, composite materials, immunology, virology, biology, botanical biotechnologies, research on arid and desert zones, and hydrobiology. Despite the existence of 29 inter-university accords, exchange students are few—only 223 Israelis, 50 percent of them in the humanities, are studying in France—because of the drawing power of American universities.

Despite the existence of a French-speaking community of about 500,000 persons, the French language is clearly on the decline in Israel, both because it enjoys no official status in the education system (whereas English and Arabic are mandatory), and because since 1962 Hebrew has been among the 14 living languages in which applicants may take the French university entrance examination.

France: CNRS Opens New Research Center

94WS0153B Paris AFP SCIENCES in French 25 Nov 93 pp 12, 13

[Article: "Nonlinear Institute of Nice (INLN) Launched at Sophia-Antipolis"]

[Text] Sophia-Antipolis—The Nonlinear Institute of Nice (INLN), a joint research unit of CNRS [National Scientific Research Center] and the University of Nice, officially inaugurated its new Sophia-Antipolis facility on 22 November.

Created in January 1991, the institute headed by Gerard Iooss, a professor at the University of Nice-Sophia-Antipolis, was housed until now at the University of Nice. In attendance for the inauguration were CNRS director general Francois Kourilsky, Nice University president Michel Bornancin, Mr. Pierre Laffitte, a senator and president of "High Technology Road" (an association of provincial technology centers), and a number of mathematicians, physicists, and chemists including Ilya Prigogine (Nobel Prize for chemistry, 1977). The ceremony afforded Mr. Daniel Thoulouze, head of CNRS's Department of Physical and Mathematical Sciences, the opportunity to present the Center's 1993 Silver Medal to Pierre Coullet, head of the INLN research group studying "instability and chaos".

The staff of INLN, whose founders include Gerard Iooss and Pierre Coullet, consists now of 31 scientists and academics in diverse disciplines—mathematics, theoretical physics, experimental physics, engineering, etc.—26 graduate students, and 12 "visitors." It seems destined for further growth: Although Nice-based nonlinear phenomena researchers have succeeded in creating a real school, a number of similar laboratories have long been in existence in the United States. According to one expert in this domain, Albert Libchaber (Princeton University and NEC laboratory), "Europe is far behind the United States in this field."

INLN is divided into six groups—"instability and chaos," "theory of branch-points and applications," "theory of (quantal) fields and applications," "topological and differentiable dynamics," "stability and boundary control of continuous media," and "experimental nonlinear dynamics"—composed of mathematicians and physicists as well as researchers in optics, meteorology, and biology. Currently staying as a guest at the institute is Russian scientist Professor Valentine Krinsky, whose work focuses particularly on chaotic phenomena in cardiology and who might remain at INLN.

With this new installation, CNRS strengthens its infrastructural base in Sophia-Antipolis, now the site of three of its own laboratories, two joint laboratories, and seven affiliated laboratories, in addition to the Provence-Alpes-Cote-d'Azur [PACA] regional delegation's branch office for Alpes-Maritimes.

Nonlinear Meteorology

In meteorology, a field marked by chaotic phenomena, research into nonlinear phenomena can help improve forecasting. For decades now, according to Guy Plaut, INLN's only meteorologist, autumns in Provence have been either unusually dry or punctuated by repeated "deluges." This year, between 13 September and 10 October, downpours were truly torrential: 90mm of water on 13 September, 50 on 23 September, 40 on 1 October.

Once a "cycle" of drought or very high rainfall is established, it tends to last a long time. There is no way yet to make predictions in this kind of situation, but by correlating precipitation readings with measurements of barometric pressure (at sea level and high in the atmosphere) in the North Atlantic, it should be possible to identify the critical determinants for these rains and make probabilistic forecasts. Doing so will require data—40 years' worth—at both global (hemispheric) and local levels—from the National Meteorological Center of Boulder (Colorado) as well as Nice's Meteo-France weather station, for example.

In future, says Plaut, it should be possible to predict by late August the likelihood of these autumn "deluges." In general, it should be possible to make probabilistic predictions for any such changes of broad weather pattern.

The study of nonlinear phenomena can also help predict consequences of the greenhouse effect. "We must not think about the greenhouse effect in linear terms," says Plaut: It could push climatological variables into a "sensitive" or chaotic zone that might lead either to warming or to cooling. "Paradoxically, a warming trend could in theory lead to a cooling effect."

FRG's Spaeth Proposes Changes in Technology Policy

94WS0168A Stuttgart BILD DER WISSENSCHAFT in German Jan 94 pp 40-43

[Article by Lothar Spaeth: "Ways of Getting Out of the Innovation Crisis"]

[Text] Germany's status in technology is in jeopardy. Dr. Lothar Spaeth, managing director of Jenoptik, believes that nothing less than a major thrust in innovative developments can save Germany's traditional leading industrial position. Spaeth, the former minister president of Baden-Wuerttemberg proposes a new technology policy.

When, in the face of the current recession, we ask ourselves if Germany industry had taken advantage of the "fat" years of the 1980s to improve its competitiveness, the answer must be a resounding "no." The structural deficits revealed by the downward economic trend attest that in recent years we have been living too much off past achievements while neglecting innovation.

If we continue to rely on older products, whose net product has stagnated and whose markets have shrunk, we shall not be able to achieve sufficient growth in the future to ensure full employment in the western part of our country or to build up employment in the eastern sector. This trend can only be confronted by a qualitative leap forward. Neither marginal improvements nor quantitative growth can reverse the trend. Germany absolutely needs an innovative thrust to capture the expanding world markets with new, high-quality products, processes, and problem solutions.

In this report I have listed what prerequisites I believe Germany needs to undertake such a new beginning. I also point out the dangers and pitfalls that lay ahead and the measures that must be taken now to create a secure, promising economic future in Germany and in Europe generally.

Obsolescence. German technology is becoming increasing obsolescent. This becomes immediately evident when we compare our technology products with those of our competitors. The so-called RCA-Values (Revealed Comparative Advantage), which indicate the degree of industrial goods specialization in foreign trade, shows this clearly.

To be sure, Germany remains, as before, a leading exporter of some advanced technology. However, really top technological products only appear in the export figures on a below average level.

The danger therefore exists that in a few years the technologies, which are still considered advanced today (e.g., in the automobile and machine tool sectors), with their so-called "mature" products and processes, will no longer be profitable in Germany. Of course, our economy will still need such "cash cows" to ensure high income and employment figures in the future.

Nonetheless, it is obvious that, owing to the deficits in "birthing" new technologies, an insufficiency will develop in income- and employment-intensive products in the advanced categories. The top technologies of today, considered "problem children" because of their characteristic high risk and investment requirements, will be the advanced technologies of tomorrow. Instead, two trends could appear:

First, withdrawal from the mass markets into exclusive niches, since cost-covering prices can only be obtained by marketing special products. Of course, employment requirements will drop and there will be an insufficient cash-flow to ensure new developments.

Second, an innovations gap develops and the technological top position is lost. Should Germany be cut off from the technological "nourishment chain" because more and more links of that chain have been captured by American and Japanese competitors, this competency loss could only be made good—if it could be made good at all—through very high overall economics costs.

Catch 22 Situation. Technologically speaking, Germany finds herself in a double bind. On the one hand, Japan and the United States threaten to dominate the top technologies, and, on the other hand, cheap Asian and East European labor costs are pressuring traditional German mature products. Germany has found herself in this hopeless position between the leaders in top technologies and the low cost producers because she does not have a clear competitive advantage in either of the two fields. Rising unemployment and the growing number of needy industrial centers will tie up the resources required for technological renewal.

It is not yet known whether this vicious circle can be broken. While the German Federal budget is supposed to increase 4.4% in 1994, the budget for research will remain nominally the same, i.e., it will drop in real terms. Due to reunification, the share of the economy's total expenditures for research in the gross domestic product has dropped dramatically from 2.88% in 1989 to the 2.66% in 1991. The situation is aggravated by the fact that of the 85,000 researchers in East German industry in 1989, more than 70,000 have already been discharged. Deindustrialization in the former GDR is devastating the research community and is—to a great degree—retarding economic development there.

Competence. It is not yet sufficiently understood by the public that the loss of technological competence will inevitably result in strategic, i.e., long-term disadvantages and economic dependencies for Germany and for Europe. Defenders of the liberal foreign trade theory should realize that different laws pertain to the high technology markets and that it is extremely important whether a country producers microchips or potato chips.

Such purely statistical thinking completely misjudges the importance investments in the so-called key technologies play in our future. Our country's standard of living, which is based on innovation and export, is already endangered and significant cutbacks are predictable if we fall behind further technologically on the world market.

The following conclusions must be drawn:

First, resources have to be concentrated and strategically redirected. The federal government is already in debt for its two largest budget items—social services and debt servicing (according to the 1997 financial plan, 112 billion German marks [DM] in taxes alone) to the point where the scope of possible actions in promising future fields rapidly disappears. Financial resources used as subsidies to support dying industries—whether in western or eastern Germany—are no longer available for promising future developments.

Second, in concord with the strategic importance of high technology, research policy must also be strategically redirected. The presently held definition of research foci (priorities and posteriorities) is very promising in this regard. This approach must not be opposed by any orthodox economic policy. Rather, all parties must participate in the "strategic dialogue" between the political, economic, and scientific sectors initiated by former Minister of Research Riesenhuber.

An intensified concentration and coordination of efforts in research and technology is especially urgent at the European level. Instead of breaking down into innumerable scattered mini projects as happened in the case of JESSI, the European microelectronics initiative, far fewer, but essential research areas have to be established—each with precise targets.

Third, guidelines have to be established to promote innovation. Technological, structural, and economic policies must all be interconnected, especially in the new federal states, to ensure that all resources are concentrated in innovative nuclei.

Legislation ought not make research and production in the technologies of tomorrow impossible by imposing excessive conditions, thereby causing them to develop and flourish outside Germany.

The risk capital market for the founders of innovative companies is still very much underdeveloped in Germany. German inventors and new company founders often founder for lack of start-up capital for the economic utilization of their innovations. Governmental incentives for private capital lenders could improve the situation in this regard.

The transfer of the results of research to the appropriate companies must be accelerated. German basic scientific research is still predominate in many fields. Unfortunately, the economic profits that might be derived from scientific successes are often lost because the theoretical breakthroughs are not converted into real products quick enough.

The public must be made aware of the fact that our country is now confronted by a critical challenge, the meeting and mastery of which is mostly dependent on our innovative capability (in technical as well as societal matters). A comprehensive public discussion of problems pertaining to future technological developments, which would create understanding and acceptance for new economic and technical opportunities, is therefore highly desirable. The opening of East Europe has imparted an additional dynamic to the technological competition in the Europe-USA-Japan triad. At the same time, Germany is being confronted with another great challenge in the problems associated with unification.

All the more reason for a reevaluation of policies now. With respect to economic performance as measured by the per capita gross domestic product, Germany today is in the sixth position in Europe, behind Italy. Germany must rid herself of compulsive distribution and redistribution thinking and return net product to top priority.

We in Germany are currently warring over individual assets, while the sources of our collective standard of living—innovation, productivity, and strength on the world markets—are gradually drying up here at a time when they are bubbling forth in other countries.

It should be clear to all of us that international developments are not going to wait on Germany and that global competition is rapidly entering a new phase. In the second half of the 1980s, international direct investments grew three times more rapidly than did world trade. That alone illustrates the new, global dimension of technology, markets, and companies. "Global players," who research, produce, and sell in several countries, dominate the scene.

At the same time, people, capital, and know-how have become much more mobile. As Germany becomes less attractive as a site for research and production, companies react by selectively distributing their activities and resources geographically. As the exodus of development and production in the high technology sector proceeds, ever more top German researchers will leave the country because they will no longer be able to find the conditions necessary to pursue their work in Germany.

This trend will intensify the desire to cling desperately to obsolete production practices. We are investing too much money in trying to make outdated facilities more efficient, instead of transplanting them to low-wage countries, where they could continue to be operated profitably and the money that would have had to be invested to increase plant efficiency at home could flow into the development of new products.

It would be to our mutual benefit if these new production opportunities were quickly realized in the East European countries. In this way, Germany could both retain her position on the volume markets as well as stay abreast of the Japan-South East Asia and the United States-Mexico competition in high tech.

In addition, such a strategy would provide the basis for closer economic cooperation with the reformed East European countries. This strategy could provide the opportunity for Europe to transform its economies through its own efforts by means of free trade and industrial cooperation. Strengthening economic performance in the West and distributing certain other sectors of industrial work to our eastern neighbors could well be the basis for stability and well-being throughout Europe.

EU Approves Biotechnology Patent Directive

94WS0174E Paris AFP SCIENCES in French 23 Dec 93 p 21

[Unattributed article: "Toward Legal Protection for Biotechnological Inventions in Europe"]

[Text] Brussels—Following a meeting of the twelve ministers in charge of the EU [European Union] domestic market, held on 16 December, the chairman of the meeting, Mr. Robert Urbain, Belgian minister of European affairs, announced that the twelve had agreed on legal protection for biotechnological inventions within the Community. The draft directive (European law) aims first of all to promote the competitiveness of EU science and industry in the field of biotechnology.

"Because inventions could not be protected in Europe, recent years saw a European brain drain toward areas where their patents were better protected," Mr. Urbain pointed out. The draft directive makes it possible to patent therapeutic methods that modify the human genetic

makeup, but it also establishes the basic principle that the human body cannot be patented. "We are not going to promote genetic engineering."

According to an expert, the objective is to pave the way for methods which offer prospects of curing hundreds of diseases, such as cystic fibrosis. It is understood that modifications must be undertaken solely for therapeutic purposes and must be fully consistent with human dignity.

According to a diplomatic source, Spain was opposed to all methods that would lead to a modification of the human genetic makeup. "But if such modifications are patentable, it does not follow that they will be allowed," the Belgian minister also pointed out. The draft directive must still be formally approved by a ministers council before coming into force, by 1996 at the latest.

EU Adopts Fourth Framework Program

94WS0174A Paris AFP SCIENCES in French 23 Dec 93 pp 1, 2

[Unattributed article: "The Twelve Agree on the Fourth R&D Framework Program (1994-1998)"]

[Text] Brussels—On 22 December, the research ministers of the twelve members of the European Union [EU] agreed on their fourth R&D framework program (PCRD), covering the period 1994-1998, and allocated to it an overall budget of 12 billion ECUs [European currency units] plus a reserve of 1 billion ECUs; the announcement was made by the Belgian minister, Jean-Maurice Dehousse at the close of the meeting he chaired in Brussels, the third such meeting in three months.

The ministers followed the recommendations of the EU summit of 10-11 December. The heads of state and prime ministers proposed an overall budget of 12 billion ECUs with a one-billion reserve that might be released in 1996, after a survey of the results is made halfway through the program.

The European Commission had proposed an overall budget of 13.1 billion ECUs, the European research commissioner, Mr. Antonio Ruberti, recalled. The agreement reached "guarantees the continuity of the EU research effort at a time when the EU is starting concerted efforts to revive the economy and competitiveness of the European system," he pointed out.

The European Parliament, whose agreement is required for the final adoption of the budget, had asked for a total allocation of 13.7 billion ECUs at the time of its first reading in November.

The ministers also decided how to distribute the funds among various activities: research proper will get 87.8 percent of the overall budget. Of this, research on information and communication technologies will get the lion's share with 28.20 percent, followed by the energy sector (non-nuclear energy, nuclear fission safety, and thermonuclear fusion control) with 18.65 percent.

Research on industrial technologies come in third position (16 percent), followed by life sciences (13.10 percent), environment (nine percent), transportation (two percent), and social and economic sciences (0.85 percent).

In addition, the framework program will finance researcher mobility and training, the dissemination and implementation of research results, and international cooperation. Finally, the ministers decided to earmark 875 million ECUs for the Joint Research Center, in Italy.

Breakdown of R&D Framework Program Financing [Billions of ECUs]

Title 1 (research)	Percent	Out of the 12 + 1 Billion ECUs	Out of the 12 Billion ECUs Already Allocated
Information technology	28.2	3.666	3.384
1. Information systems and services	6.85		.822
2. Communications	5.25		.630
3. Information	16.1		1.932
Industrial technology	16	2.08	1.92
4. Industry and materials	13.6		1.632
5. Measurements and tests	2.4		.288
Environment	9	1.17	1.08
6. Environment and climate	7.1		.852
7. Marine technologies	1.9		.228
Life sciences	13.1	1.703	1.572
8. Biotechnology	4.6		.552
9. Biomedicine and health	2.8		.336
10. Agriculture and fisheries	5.7		.684
Energy	18.65	2.425	2.238
11. Non-nuclear	8.2		.984
12. Fission safety	3.45		.414
13. Fusion	7		.840
Transportation	2	.260	.240
14. Transportation			
Social and economic research	0.85	.110	.102
15. Social and economic research			
Total Title 1	87.8	11.414	10.536
Title 2 (cooperation with third countries)	3.5	.455	.420
Title 3 (research implementation)	2.5	.325	.300
Title 4 (human resources and mobility)	6.2	.806	.744

France Launches Research Policy Review

Paris AFP SCIENCES in French 9 Dec 93 pp 1, 2

[Unsigned article: "Publication of the Preliminary Orientation Report on the Major Objectives of French Research"]

[Text] Paris—The national debate on the main objectives of French research has begun now that the preliminary orientation report prepared by twenty-seven important figures in the fields of science, technology, and economics has been sent to the directors of the major organizations.

The report of about fifty pages is the result of five work sessions held in September and October. It will now be analyzed and evaluated by the academies (the Academy of Science and Academy of Ethical and Political Sciences) at College de France; by the Parliamentary Office for Scientific and Technological Options; by the conference of university presidents, deans of major educational institutions, and directors of engineering schools; by the heads of organizations such as CNRS, INRA, or INRIA; by the Economic and Social Council; by unions; and by cabinet ministers.

A new meeting of the study committee, in January, should incorporate findings stated in a new report due on 20 January at the latest, so as to form the focus for an in-depth institutional consultation and for national and regional forums, and later for a national summary debate as well (these being scheduled between 15 February and 31 March). The result should be a final orientation report intended to be the solid core of a document which will be sent to Parliament for debate during the spring 1994 session.

Francois Fillon, minister of Higher Education and Research, has been the moving force behind this vast national consultation on scientific and technological research policy for the coming years, which is meant to continue the national forum on research held twelve years ago at the initiative of Jean-Pierre Chevenement who was minister at the time.

For Robert Dautray, president of the study group and high commissioner for atomic energy, who commented on the preliminary report, one of the most difficult problems which absolutely must be included in assessments of higher education and research problems, is the increase in the number of students, the changing role of the teaching profession, and the resulting need for new opportunities.

The influx of students in general education further increases the importance of the problem. It would be appropriate to create training programs that are brief, technical, and less selective than the current IUT and BTS. There should be many more full-time instructors, and more university awareness of the industrial world and its problems. According to Jacques Friedel, president of the Academy of Sciences, it would be appropriate for researchers to crown their careers in an academic setting.

Another problem is the question of major research equipment, indispensable but increasingly expensive tools which often require joint purchase and management with many countries. Basic research must in no way be neglected or channelled because it nurtures future applied research, according to Catherine Cesarsky, an astronomer at CEA (Saclay). French basic research is good, recognized in countries abroad and in turn more open to them because it has improved during the past ten years. It provides five percent of the material in major scientific publications. France's competition must be met, its engineering research increased, its risk-taking encouraged, and its chronic conservatism overcome.

For the study group, and particularly for Pierre Douzou, member of the Academy, life sciences, medical research and agronomic research with their applications are increasingly converging at a fundamental level through genetic studies, but too often, except for the pharmacological sector, industrial applications are late in coming or fall short of expectations.

Concerning the major programs which are also at the core of these investigations, second only to space problems, the preliminary report finds as does Jacques-Louis Lions, former CNES president, that it behooves the government, if it chooses these programs, to also set their goals concretely, clearly, with specific objectives and timeframes. They should be evaluated openly and he did not deny that the computer, supergenerator, and space programs should have been reassessed in a timely fashion.

Thanks to their increasing capabilities and speed, computers have become a universal tool which spill over into all fields such as aeronautics research as a whole. The constant influence of present circumstances and of economic problems on industrial research, which together with innovation in PME-PMI (small and medium enterprises) is still much too inadequate, often has negative effects. At the same time transfer of knowledge and technology continues to take place too slowly and badly, notably with respect to small enterprises, partly because of inadequate basic research which is not "finalized" and because work likely to be of interest to research and already performed in laboratories is not well known.

According to Pierre Aigrain, former minister, the preliminary report has drawn up a list of questions and has defined some of them very well. According to him, for science and technology to play their proper role today, research has to be less compartmentalized, has to recover its flexibility while keeping its discipline, its quality, its very excellence; its work must be held relevant to industrial requirements.

In a way, according to sociologist Alain Touraine, science has to become more community-oriented and scientists must examine the ways in which the consequences of knowledge affect society.

SPD Publishes Paper on Research Policy

94WS0144A Frankfurt/Main FRANKFURTER ALLGEMEINE in German 11 Dec 93 p 4

[Article by STUe: "An SPD Government's Idea of Research: 'A Great Coalition of Reason,' More Money, the Energy Policy"]

[Text] Bonn, 10 Dec—A federal government headed by the Social Democrats would want to set in motion a broad dialogue between the economic sector, science, the labor unions, and the state on the direction technological development should take and the individual measures to be instituted. Vosen, the research policy spokesman for the SPD [Social Democratic Party of Germany] group in the Bundestag, said in Bonn that a social consensus on this domain does not at present exist in Germany, as demonstrated by the examples of genetic engineering, nuclear power, or the transrapid. "We need a great coalition of reason for research that cuts across all party boundaries," Vosen insisted. The SPD politician conceded that this consensus did not exist in his party either on a good many issues. Thus, unlike Social Democratic traffic politicians, he came out in favor of a transrapid application line in Germany. The call for "more boldness in technology!" is also aimed at the SPD.

Vosen presented a 10-page "blueprint for a research and technology policy for the SDP-government program." Agreement on the paper has not, to be sure, been reached with Glotz, the member of the election campaign team responsible for education and research, but it will have some influence on the program. In the paper he says that the existing obstacles to innovations in law and administration must be eliminated. Vosen demanded that the research budget, which in past years has served as a "piggy bank," be clearly increased from 1995 on. If the budget had grown since 1986 as the entire national budget has, DM3 billion more would be available for research in 1994 instead of just the actual DM9.47 billion.

The SPD differs from the coalition in its assessment of nuclear energy. The SPD lays stronger emphasis on the development of renewable sources of energy and energy conservation technologies. Moreover, it focuses chiefly on the "humanization" of working conditions, research on peace and conflicts, and the humanities. The government has come more into line with the SPD's criticism of the costly manned space programs because of the shortage of funds. Additional major focal points cited in the SPD plan are the development of research on the environment and health, the strengthening of stat-of-the-art technologies like information technology and telecommunications, genetic engineering and biotechnology, research on materials, and the development of new fuels and ideas for dealing with traffic. Vosen came out in favor of the reintroduction of tax support for research and demanded legally established rights for the Bundestag to take part in government decisions on research programs. Vosen attested to Minister of Research Krueger's (CDU [Christian Democratic Union]) good intentions. But he said that Krueger had been unable to assert himself up to now, as the budget debates demonstrated. He does not even have much to say in his own house. He said that the "secret minister of research" is Krueger's secretary of state, Ziller.

Germany's Network of Technology Centers Viewed

94WS0143A Duesseldorf HANDELSBLATT in German 1 Dec 93 p 5

[Article by "fo" under the rubric "Business and Politics": "Technology Centers/162 Centers in Germany - Establishment Boom in New States - Example for East Europe. Rexrodt Criticizes Business's Innovation Failing"; first paragraph is an introduction]

[Text] Berlin, Tuesday, 30 Nov 93 (HANDELSBLATT)—Technology and founder centers have proven their worth as a tool for regional business development and promotion of innovation in the federal republic. The Arbeitsgemeinschaft Deutscher Technologie- und Gründerzentren e.V. [Association of German Technology and Founder Centers Registered Association] (ADT) has drawn this conclusion.

The occasion is the establishment of the first German technology center in Berlin (BIG) 10 years ago, which thus far has been followed by 161 additional foundings of centers over the entire territory of the federal republic. However, innovation centers are not a wonder drug by which jobs can be guaranteed in inefficient or uncompetitive companies, said Heinz Fiedler, head of ADT's managing board, putting a damper on excessive expectations at the fifth anniversary of his association.

Particularly in the new federal states, where a real boom has developed since the change, "creating the bases for the development of small and medium-sized businesses" is of prime importance. Therefore, according to Fiedler, the centers in Eastern Germany are not serving mainly technology companies, but on the whole are oriented toward the promotion of entrepreneurship.

In this sense, in the association's opinion, German innovation centers could also serve as a model for comparable institutions in the East European countries. However, a copy of the successful models from the West is not possible. Instead, the designs have to be adapted to the particular requirements in East Europe. However, Fiedler judges that this should cause no problem, because in Germany too each center is oriented toward local concerns and therefore is "somewhat different from the others." According to ADT, by now 100 founder centers exist in the former COMECON countries.

Fifty-two centers have come into being in the new federal states, and they are distinguished by strong expansion of their regional offerings. Today they are offering to 500 companies with 3000 employees a business-oriented infrastructure that is assisting in the move into independence. More than 22,000 employees of just under 2700 companies are now working at innovation and founder centers in all of Germany. Just a few have given up in the last 10 years according to ADT.

Because the innovation centers are regional initiatives, their spatial distribution differs very much over the territory of Germany. For example, while Bavaria has just four such centers, the intensive development in North Rhine-Westphalia has resulted in the establishment of 49 facilities. Saturation has been reached by now in some federal states, says ADT head Guido Baranowski. In his opinion both public and private-industry models have proven their worth in financing. In any case, the innovation centers have to make their terms and conditions market oriented in the long run, in their own interest and also in the interest of their companies.

Federal Minister for Economic Affairs Rexrodt (FDP [Free Democratic Party]) in the prelude to ADT's anniversary criticized German industry's failing in innovation. The reasons for this lie in companies themselves too, the minister said. Financial relief and beneficial tax incentives alone can bring about no fundamental changes. In this connection, Rexrodt also called for a better functioning venture capital market in Germany. In spite of the numerous venture capital funds in the meanwhile, no breakthrough has been attained to date in this area.

Finland's Plans for State R & D Investments Viewed

94WS0140A Helsinki HELSINGIN SANOMAT in Finnish 4 Dec 93 p A13

[Article by Riitta-Eliisa Laine: "Science and Technology Council Emphasizes Research Quality; Efforts to Increase Research's Share of Funding in Finland"]

[Text] The Science and Technology Council's development strategy lays emphasis on a policy based on knowledge and know-how in Finland in the 1990s despite the country's economic difficulties.

"It is absolutely essential for us to be able to get beyond the recession so that the basis of our know-how is preserved and we can reap the fruits of our investments in a national system of innovations in the future as well," the chairman of the council, Prime Minister Esko Aho (Center Party), said during a press conference on the report in Helsinki on Friday.

According to him, it is also a question of changes in challenges. "Internationalization is imposing a demand for absolute quality. Only high-quality products are successful on international markets, just as only research that represents the international level has a chance of participating in international collaboration on equal terms."

Funding for Research Must Be Realistically Increased

The report that outlines the three-year period, 1994-1996, "A Finland of Knowledge and Know-How," considers it to be especially important for us to be able to realistically increase funding for research and do it so that the percentage of the gross national product (GNP) invested in research increases. Both private firms and the state must increase funding for research. The goal is a 2.7-percent share of the GNP by 1997. With this relative investment Finland would rank fifth among the OECD countries this year.

The Science and Technology Council points out that government funding for research will clearly be reduced next year. The detrimental effects of the cuts will especially heavily hit the universities. The council considers preservation of their ability to operate to be important. According to it, university research resources would have to be developed in cooperation with the Academy of Finland.

Painful Decisions Have to Be Made

We must be able to improve the quality and productivity of research. As the chief ways of doing this, Aho cited making appropriations more competitive, systematic evaluation of research projects, and structural improvement of research activities.

"We are also inevitably facing painful decisions: the reallocation of funds and the elimination of poor quality research without prospects of success," Aho said.

In its development strategy the Science and Technology Council expresses the view that, in addition, new funds are needed to achieve objectives of current importance and to strengthen our future know-how.

More Funds Through Budget-Internal Transfers

"In connection with this, the council has concentrated on the status of basic research and the universities and on the possibilities of increasing our contribution to research and development projects stemming from the needs of the future through budget-internal transfers of funds. It is obvious that the new funds must be channeled to carefully selected projects," Aho said.

The vice chairman of the council, Minister Seppo Kaariainen (Center Party), pointed out that the development of private sector activities based on knowledge and know-how will have a significant effect on the society's ability to create new jobs.

"This development will be stronger than it has been in the future. For example, the electrical equipment and electronics industry has itself estimated that it will need 10,000 new, well-trained employees for research, production, and marketing jobs over the next few years."

Opportunities for Innovations Must Be Created

According to him, if it is implemented, this development would have noticeably more far-reaching effects on employment when we include the indirect effects on employment in subcontracting networks and the service sector. "It goes without saying that the public sector must protect opportunities for realizing this development by developing a national innovation system," Kaariainen said.

As a member of the council who participated in the study, Prof. Ilkka Niiniluoto was, like the other investigators, satisfied with the report's appropriation guidelines. "The message is ideally suited to raising people's spirits, which are currently at a very low ebb in the universities," he said.

Government Research Appropriations in Budget Proposals for 1991-1993 by Organization

	Millions of Markkaa			Real Change (%)
	1991	1992	1993	1991-1993
Universities	1,513	1,541	1,481	-5.3
Academy of Finland	449	450	449	-3.2
Tekes*	930	1,040	1,347	+40.2
Research institutes	1,580	1,624	1,560	-4.5
Other funding	790	836	897	+9.9
Total	5,262	5,491	5,734	+5.5

* [Technology Development Center]

Source: Academy of Finland

EC Pushes France to Reveal Bull's Restructuring Plans

94WS0183B Paris LE MONDE in French 5 Jan 94 p 13

[Article by EU [European Union] correspondent in Brussels Philippe Lemaitre: "Aid to State-Owned Companies: Brussels Puts Pressure on France to Disclose Bull's Recovery Program"—first paragraph is LE MONDE introduction]

[Text] Through its commissioner to competition, Karel Van Miert, the European Commission expressed its impatience at the French government's apparent reluctance to disclose Bull's and Air France's recovery programs.

Bull, Air France: the French government is paying considerable sums to these state-owned companies without submitting to the European Commission the recovery programs it is preparing. Before giving its green light, the EC must evaluate whether the efforts undertaken are likely to restore the viability of the troubled groups. Karel Van Miert, the commissioner in charge of competition, is losing patience at the French government's procrastination, especially in Bull's case.

"We have reached a completely illegal situation," he told LE MONDE. "The French government has been promising us a restructuring plan for months, but nothing is coming and there are complaints from competing manufacturers in other Community countries. This puts the Commission in an impossible position. The Commission cannot approve any more payments, or it will have to refer the case to the European Court."

Unpleasant Surprise

The commissioner noted that the French are quick to protest when they find that Brussels is not diligent enough in going after abusive state subsidies: Francis Mer, the Usinor-Sacilor CEO [chief executive officer], recently regretted that the Commission does not impose a more severe rationalization of state-owned steelmakers in Italy, Spain, and the East German provinces. It was also at France's and the United Kingdom's request that the Commission demanded—and obtained—that the Austrian government recover two-thirds of the subsidies granted to Grundig to build a plant in Austria. "The Commission must be able to act consistently," he said.

Mr. Van Miert recalled the episodes of the Bull serial: 4 billion francs [Fr] in 1992, which the French government presented as a capital increase but which the Commission actually viewed as state subsidies; Fr2.5 billion in February 1993, paid by the State and France Telecom. In October, after many contacts with the French government, the Commission started the procedure on state subsidies contained in the treaty. The plan promised by Mr. Longuet before the summer holidays, then after the summer, was not disclosed. The Brussels departments were given "broad orientations"!

In December, the Commission was unpleasantly surprised to learn that a new Fr4 billion instalment was granted to Bull. "In addition, new payments are scheduled for this year, so that total subsidies might reach Fr15 billion, i.e. Fr1,000 per taxpaying household!," Mr. Van Miert worries; he is obviously determined to prevent France from allowing itself to follow that course.

Abel Matutes, the transportation commissioner, is in charge of the Air France case, but Mr. Van Miert observed that, in this case too, the French government is doing exactly as it likes. The State already paid Fr1.5 billion and intends to grant a total of Fr6 billion to Fr7 billion. However, under pressure from strikers, the restructuring plan devised by Bernard Attali, the former Air France CEO, was abandoned. What will his successor, Christian Blanc's plan be like? Will it be convincing enough for the Commission to approve the injection of the billions required to save the national airline? Mr. Van Miert seems skeptical, noting in passing that Lufthansa, the German company, eliminated 7,000 jobs but is about to restore its financial balance. Without state subsidies.

France to Reexamine Research Priorities

94WS0179A Paris L'USINE NOUVELLE in French 16 Dec 93 pp 33, 35

[Article by Pierre Laperrousaz: "Innovation: The Government Launches a Major Consultation; New Research Policy Orientations"—first paragraph is L'USINE NOUVELLE introduction]

[Text] The minister of higher education and research has built up a conviction. His priorities: the environment, medical research, aeronautics, innovation in small to mid-size industries.

"For a country like France, it is in the nation's best interest to question itself about the main orientations of its scientific policy." To start his mandate, Francois Fillon, the minister of higher education and research, decided to send French research back to the drawing board.

To this effect, he just launched a broad national consultation among researchers in public and industrial laboratories in order to identify priority orientations for French

research. This consultation is accompanied by a so-called "Delphi" survey (based on a method developed in Japan) of 3,000 experts.

The time to perform such an audit is not necessarily ill-chosen. Things have changed since the National Research Conference organized by Jean-Pierre Chevenement 12 years ago. First of all, the economic context: During a recession, research cannot escape cutbacks. Actually, the ratio of research expenditures to the gross domestic product has stopped increasing in several countries, including France, where it remains stable around 2.42 percent. The era of triumphant science is past, and the abandonment of a large program such as the Hermes space shuttle marked a return to greater realism. Especially considering that the image of science and technology has changed in the public's mind.

"Ten years ago, it was thought that boosting research would improve living conditions. Today, the public believes that science destroys employment," claimed a spokesman for the working group created by Francois Fillon to do the spadework prior to the great national debate on research. In this changed context, redefining priorities is probably not a luxury.

Already, the minister identified a few major orientations: environment, medical research for which an additional 100 million francs [Fr] will be included in the 1994 budget, and a similar amount for upstream research in aeronautics, and innovation in small to mid-size businesses. The national consultation should make it possible to better define this research policy, which will be submitted to the Parliament during its spring session.

The working group, consisting of 26 members and headed by Robert Dautray, the high commissioner to atomic energy, just submitted its first conclusions. Their observations contain no real surprises: Basic research is good enough, but basic technological research remains inadequate; as for industrial research, not enough of it is financed by the businesses themselves, it is excessively concentrated by sectors, and small to mid-size industries are not adequately represented.

As a result, in years to come the ministry should focus a greater proportion of its efforts on basic technological research. "To ensure that it remains competitive, a country like ours needs first of all a strong technological research and efficient procedures to transfer the knowledge acquired to industrial applied research," the working group insisted. Unfortunately, engineering sciences have been "relatively neglected in France, in particular those involving expertise in complex systems and objects."

Another failure of French research is the relative inadequacy of "traditional" sectors such as building and construction, chemicals, transportation, and the agrifood business, although these sectors account for much of the economy and employment. A special effort was made in the 1994 budget in favor of the agrifood business, which doubled in recent years but nevertheless invested on the average only 0.35 percent of its sales in research, although it must integrate a whole series of new technologies (clean plants, high-pressure sterilization, ionization, etc.). The three-year program called "Tomorrow's Food," which is totally in line with the "Food for the Year 2000" program, will get Fr40 million, "i.e. 50 percent more than the annual average for 'Food for the Year 2000'," people at the ministry pointed out.

Immediate measures were also taken to support innovation in small to mid-size businesses: The ANVAR [National Agency for the Implementation of Research] budget will be 16 percent higher in 1994, reaching Fr1 billion. Actually, small to mid-size businesses are underrepresented in French research; they contribute only 16 percent of the national effort. But their involvement in research is not just a matter of money. Businesses must also have men capable of taking over knowledge and translating it into innovations. In this respect, the minister decided to double the credits allocated to Cortechs (agreements to train senior technicians through research) and he intends to promote Cifres (industrial research-training agreements), two procedures that will enable businesses to hire researchers and technicians for limited periods.

A Maze of Procedures and Parties Involved

Regional centers for innovation and industrial transfer (CRITTs), industrial relation committees (Crins) of the CNRS [National Center for Scientific Research], industrial technical centers: There is no lack of structures to help businesses in their innovation efforts. Should more be created? Certainly not, people at the ministry answered. It is already hard enough for businesses, especially the smaller ones, to find their way through the maze of parties and procedures involved. Obviously, some clarification is needed, and the ministry will undertake a study of the matter during 1994. The region might provide a rather suitable frame to improve the structure of the scientific and technical environment of businesses: "In each region, we must cause the emergence of a network of laboratories working with overall cohesion," the minister's staff explained.

Still in order to help businesses, the working group recommended to eliminate the restriction introduced in 1992 on the research tax credit, a measure that has the manufacturers' unanimous approval.

The working group also emphasized the need to strengthen the ties between public and private research, something on which everybody agrees. Joint laboratories represent interesting experiments, the group noted. What is required is to evaluate these experiments, put and end to those that are no longer useful, and create new laboratories with well-defined stakes and for predetermined probable durations. "Businesses that wish to do so should be able to collaborate with public research at high level," Francois Fillon stated for his part, quoting the example of the Bioavenir program, which associates Rhone-Poulenc and several university and CNRS laboratories. Certainly, the time when these two worlds used to distrust each other seems to be gone for good.

Germany: Need, Tasks for Technology Council Described

94WS0151A Duesseldorf HANDELSBLATT in German 16 Dec 93 p 3

[Article by Prof. Dr. Gerhard Zeidler, chairman of the board of Alcatel SEL AG and chairman of the BDI Committee on Research and Technology Policy: "Ten Tasks of a Technology Council for Networking of Strategies for the Future"]

[TEXT]The question of which technology policy is the best is the source of much debate, as has been clearly demonstrated by twenty years of argument over the issue within Germany.

The pursuance of a technology policy characterized by the following is more damaging than the complete renunciation of any such policy:

—The objective of the policy rapidly fluctuates between the "struggle to attain world leadership in the field of high technology" and the "preservation of that which we have achieved".

—With regard to the degree of interventionism, the policy vacillates between endorsing state-run enterprises and a laissez-faire approach—as well as every shade between the two.

—The programmatic orientation of the policy fluctuates between the support of broad-based and the support of cutting-edge research.

—In terms of volume, the policy attempts to accomplish more than is allowed for by current budgetary planning.

—Rather than providing a comprehensive view of technology creation, the policy wavers back and forth between assessing the state of technology and assessing the effects of legislation.

—It attempts to place the blame for the reluctance by public to accept new technologies on a few disgruntled teachers and journalists.

—The policy defines a "composite department" as one at which all other departments can slash away at will.

—The policy encourages researchers to adopt a more businesslike manner while at the same time calling upon businessmen to have more community spirit.

—The policy-makers are never able to offer internally-produced reports on the strategy of the policy, only those generated by consulting firms, Frauenhofer institutes, or commissions.

—When it comes to urgent national requirements, the policy-makers repeatedly stall for time by pointing to the European Union (EU) in Brussels.

Such a policy is worse than a (theoretically conceivable) complete renunciation of any technology policy, the economic effect of which can at least be calculated and its consequences plotted.

The Sixth Conference on Technology of the Federal Association of German Industry (BDI), held on 18 November 1993, made it clear once again that less-than-desirable conditions are making it impossible for key technological fields to fully contribute to the gross national product.

For example, the architects of the health reform did not take the effects on pharmaceutical research sufficiently into account. Spokesmen from the chemical industry state that many years of market opportunities were wasted as a result of the genetic engineering law alone. Through the Federal Ministry for Research and Technology, the German government subsidizes composite materials, the existence of which the environmental ministry is apparently unaware, as it has included complete recyclability (i.e., separation of materials) among its objectives.

The list goes on. In short, a general lack of coordination and cooperation is evident everywhere. This is no minor slip-up, but a strategic error within our technology policy. Technology policy must not be limited to technical matters; it must evolve into an innovation policy.

The lack of coordination (by whom is immaterial) that most branches of industry are only now beginning to recognize has long been obvious to those industries that deal with infrastructures. It is no coincidence that the Maastricht Treaty for the EU emphasizes the importance of "trans-European networks" for energy, traffic, and communications. In order to optimize traffic, for example, it is essential to have not only technological, but even more importantly, organizational infrastructures.

No individual sector has the comprehensive know-how necessary to build infrastructures. Consequently, it is counterproductive for each individual sector to attempt to create its own. The most important prerequisite for the creation of infrastructures within Germany as a business location in the nineteen nineties is networked strategies developed by commercial and public institutions.

Agreement between various departments will become increasingly critical, and not merely to the creation and maintenance of infrastructures. Cooperation between the research, health, environmental, and labor ministries may be as important to the chemical and pharmaceutical industries, for example, as cooperation between the transportation and postal ministries is to the creation of traffic and communications infrastructures.

Two policy decisions have recently been made that are of great importance to the needed innovation campaign. The first of these was the heartening decision by the Federal Cabinet in favor of the Transrapid. This decision must not be reversed, nor can it remain an isolated one. We must overcome the Wackersdorf syndrome and integrate the Transrapid into the transportation network.

The second decision was the decision to create a "Strategic Council for Research and Technology" within the BMFT as well as the creation of similar discussion rounds for the Federal Chancellor and the economics minister. This decision by the research minister represents an important step

forward, one to which the parties and caucuses have obviously responded favorably. The Federal President put it quite clearly: "Economic, research, and technology policy should draw even closer together and evolve into a single entity. I am not referring here to a German version of the MITI (Ministry of International Trade and Industry). State dirigism is never innovative. It can neither stimulate nor replace efforts by industry to develop new ideas. However, within the framework of a dialog between all parties, the state can provide assistance in the reaching of a consensus on technological issues and in the orchestration of the many decentralized efforts." This has nothing to do with state control of industry or investments, however.

The Commission for the Future, headed by Minister President Teufel of Baden-Wuerttemberg, also called for a council on technological strategy. This proposal does not suggest a "Council of Wise Men" in the sense of a "national board of directors." Rather, it calls for the creation of a vehicle, which, via a combination of high-ranking individuals and an effective level of activity, will bring the issue into the German political arena on behalf of Europe and address both the practical problems involved with the coordinated development of infrastructures and other issues as well. Another important function of this council should be furthering public acceptance of new technologies. The marketplace is the sole test of public acceptance.

In my opinion, such a strategic council should be assigned the following ten tasks:

1. It should increase the political importance of research and technology issues without eclipsing the cost crisis generated by politics and wages.
2. It must provide models and visions that demonstrate the importance of new technologies, not only to prosperity and employment, but also to the attainment of other social objectives. These include such widely diversified aims as victory over hunger, war, and AIDS through the use of biotechnology, increasingly recycling-oriented design, resource-efficient energy supply, and the overcoming of distance via modern traffic and communication systems.
3. It must make it clear that it is becoming increasingly difficult for commercial enterprises to implement innovative new product lines without assistance. They require supporting legislation and administration (licensing procedures) and, in many cases, long-term political support (as in the case of energy). The council must serve as a political go-between. It must develop strategies for introducing complex new innovative product lines.
4. It must ensure that new lines of technology are married with infrastructure projects (including those that are privately financed) and innovative public procurement.
5. It must evaluate the entire technology policy and, in particular, new legislative proposals in terms of innovation.
6. It has the task of developing criteria for an efficient, strategically oriented, policy for supporting research and technology, including tax-supported research support.
7. The council must promote the strategic reform of the German research landscape (more application-orientation, competition for external funding).
8. It must decide whether strategic dependencies (in the microelectronics field, for example) should be tolerated or discouraged.
9. It must ensure that research support by the EU, the Federal Republic of Germany, and the laender is adequately dovetailed in terms of strategy.
10. Finally, the council must discuss whether German technology policy should be augmented, either temporarily or on a long-term basis, by additional innovative and structural tasks such as those currently confronting Germany as a business location as it endeavors to integrate the new laender.

The BDI will determine by Easter whether a consensus with the political community can be reached on the basis of such a task list. The industrial community has already begun to prepare for the strategic dialog. Where necessary, it will support that which is to be achieved through common strategies of the political, administrative, scientific, and industrial communities via an industry-wide internal dialog, such as on issues of common technology development and subcontracting. For without internal networking and coordination, industry will be unable to fully participate in the strategic dialog.

ESA Member States Agree on Manned Space Flight Program

94WS0200A Paris LE MONDE in French 21 Jan 94 p 10

[Article by Jean-Francois Augereau: "Europe Reaches an Agreement on Manned Flights"]

[Text] Eventually, it took the Europeans over one year after their Granada (Spain) meeting of November 1992, to reach an agreement on their manned space flight policy. Following several postponements, in October and December 1993, representatives of ESA (European Space Agency) member states agreed on Tuesday 18 January, after a marathon negotiation.

The Europeans decided to provide preliminary financing over the next two years for the MSTP (Manned Space Transportation Program) supported by the French (up to 107 million accounting units[1]) and for the Columbus program pushed by the Germans (270 million accounting units). The Europeans will meet again in mid-1995 to decide whether or not to proceed with these programs.

The first of these programs, the cost to completion of which was estimated last September at a little under 2 billion accounting units, aims to service orbital space stations with two vehicles: the CTV (Crew Transport Vehicle), a sort of large capsule capable of carrying men

and equipment; and the ATV (Automated Transfer Vehicle), an intelligent service module required for setting manned modules and capsules into orbit and for their rendezvous operations. According to the ESA, the second flight of the new European Ariane-5 launcher, in 1996, might provide an opportunity to launch a sort of unmanned pre-CTV.

The second program, Columbus, has an estimated cost of 2.3 billion accounting units; it will involve building a manned module, the APM (Attached Pressurized Module), which is becoming less ambitious as time and budgets go by and should one day be added to the future international space station concocted by the Americans and the Russians, soon to be joined by the Europeans and the Japanese.

The ESA council decided to implement an "Act in council" that should soon bring the MSTP and Columbus programs under a single banner, making it easier to negotiate with manufacturers and to join forces for the negotiations with Moscow and Washington.

Footnotes

1. One accounting unit is worth about 7 French francs.

French Research Minister on Policy Debate

Paris AFP SCIENCES in French 6 Jan 94 pp 1, 2

[Unsigned article: "Francois Fillon Confirms 'The Government's Intention to Make Research a National Priority'"]

[Text] Paris—According to a statement on 6 December by Francois Fillon in his New Year's greetings to the media, the French government "is politically determined to make research a national priority," and is relying heavily on the major debates now taking place to define by June the broad outlines of the national scientific policy.

The Minister of Higher Education and Research emphasized that "in Europe, France is the only country where the research budget is increasing, even if modestly. I can tell you that during my meetings with colleagues from neighboring countries, I learned that budgetary constraints were affecting their research much more severely than our own."

The minister added that the national debate has been opened. It will continue with the organization of a series of six regional conferences, the first of which to take place in Le Mans on 14 February, followed by others in Marseille, Grenoble, Bordeaux, Strasbourg and Lille before the concluding national debate scheduled for 9 April in Paris.

Fillon further said that "the preliminary task force report being circulated since 26 November has already inspired some fifty responses, mostly but not exclusively from the major research institutions." The 30,000 copies of the final report will be mailed out beginning on 1 February so that in-depth institutional studies may get started.

The six scheduled conferences will address research and innovation in PME-PMI (small and medium size enterprises), reports from the scientific and social communities, research and enterprises aimed at competitiveness, basic research, ways of enhancing "France's assets," advanced training and research organizations: structures and trades, and finally, the international scope of research.

Fillon does not want these conferences, each of which will involve around 300 invited participants, to become "High Masses," but rather to generate "genuine dialogue." He expressed hope that they will result in important ideas from which the government will formulate the scientific and technological policies required by the country's development and by the international context. He did not conceal his support of proposals for a five-year or programming law as in the case of Defense, but he acknowledged that these proposals would probably have to wait until after the 1995 election.

In response to some questions, Fillon said he hoped that the new French space policy "would be defined soon. My ministry has expressed its views on the subject but the Ministry of Industry is the one in charge of Space." The minister announced that the first contract between the government and research organizations would probably be signed with the Atomic Energy Commission (CEA), then with the National Institute for Computer and Automation Research (INRIA).

With more specific reference to higher education, the minister restated his intention of initiating as of this year "a genuine technological track" and to intensify efforts to reduce the concentration of his ministry's departments toward colleges and universities, through the proven approach of decentralization.

Agenda for National Debate on Major Objectives of French Research

Summary of 1993 Agenda	
September 1993	Introductory session of task force (Chairman: R. Dautray)
14 October 1993	First meeting of task force (a total of five meetings)
26 November 1993	Preliminary orientation report sent to institutional "inner circle"
22 December 1993	Deadline for preliminary report responses
Agenda 1994	
6 January 1994	Task force meeting for response review
20 January 1994	Final report sent to national printing house (edition of 30,000 copies)
1 February 1994	Opening date for report mailing for a second in-depth institutional consultation
14 February—15 March 1994	Six regional national topical symposiums
9 April 1994	National concluding debate
April 1994	Preparation of summary document based on national debate
June 1994	Parliamentary debate

National Topical Symposiums

Date	Location	Topic
1 - Monday 14 February 1994	Le Mans	Research and Innovation in PME/PMI
2 - Friday 18 February 1994	Marseille	Science and Society
3 - Tuesday 22 February 1994	Grenoble	Research and Enterprise: Aimed at Competitiveness
4 - Friday 4 March 1994	Bordeaux	Fundamental Research: Enhancing France's Assets
5 - Tuesday 8 March 1994	Strasbourg	Advanced Training and Research Organizations: Structures and Trades
6 - Friday 11 March 1994	Lille	International Dimensions of Research

National Concluding Debate

Date	Location	Topic
Saturday 9 April 1994	Paris	Conclusions on Topical Symposiums

European Commission to Freeze 2.5 Billion Franc Aid for Bull

94WS0207A Paris LE MONDE in French 27 Jan 94 p 18

[Article by Caroline Monnot: "Following the European Commissioners' Meeting, Brussels Will Freeze 2.5-Billion-Franc Aid for Bull"]

[Text] Brussels is expected to freeze temporarily the second installment of the capital appropriation that the French government was planning to give to Bull. Karel van Miert will notify Paris of the decision on Wednesday 26 January, after the commissioners' meeting. The freeze applies to the 2.5 billion francs [Fr] that were to supplement a first contribution of Fr4.5 billion made available in December 1993. Actually, the government promised to pay Fr7 billion in new money to Bull during 1993 and 1994. To this amount should be added the contributions made by the other shareholders: France Telecom, which paid Fr1 billion of the planned Fr1.4 billion, and NEC, with a little under Fr400 million. IBM declined to provide any additional capital to the French state-owned group.

People in Brussels refuse to dramatize the freeze. "We are merely applying the regulations in force concerning aid. The French government did notify us of these payments. But part of the payments was made available before the Commission had decided on the case," they explained. The European executive branch denies any intention to engage in a power struggle with Paris: "It's a rather measured reaction. European Court precedents enabled us to suspend the payments already made. This option was not accepted."

According to the Commission, the freeze will give Paris some more respite. People in Brussels said they were still waiting for Bull's famous strategic plan, which Gerard Longuet promised at the beginning of summer. In an interview with LA TRIBUNE-DESFOSSES, on Wednesday 26 January, the minister of industry blamed the delay on the burden of the past. "We inherited 10 years of ambiguity in Bull's management," he said. "Do not ask us to correct a 10-year trend in just 10 months." And he added: "It will take us two years."

Germany's SPD Sees R&D Investment, Commitment Lag

94WS0184A Duesseldorf VDI NACHRICHTEN in German 24 Dec 93 p 2

[Article by Wolfgang Mock - "Demand for Increase in the Research Budget and for Tax Relief on Research Investment"]

[TEXT]

SPD: Intergenerational Commitments Can Be Built Only Upon the New Technologies.

SPD research policy makers like Josef Vosen find "the growing loss in importance of research and technology policy" to be "nothing short of irresponsible." By the middle of the projected decline, the speaker on research policy of the SPD [Social Democratic Party of Germany] calculates that "the share of the research budget will sink below 2% of the federal budget for the first time in 20 years. And in view of these numbers there can certainly be no question" of a research policy initiative by the government coalition.

More than in the past years, the German Social Democrats now also see in research and technology policy a way out of the economic crisis. What was previously the province of a few specialists in the Federal Parliament is increasingly becoming a prime-time topic. Still in mid November, Rudolf Scharping allotted unusually much space to research and technology policy at the party conference in Wiesbaden. Also Oskar Lafontaine, the economic and political forecaster of the Social Democrats, has always granted it a central roll in the "future perspectives for a model Germany."

In the "Government Program 1994" Commission, a task force under the direction of Peter Glotz is currently developing a concept of a research and technology policy for the SPD's government program. It is supposed to be presented early next year.

An early outline of this conceptualization is already taking shape. "Above all," according to Vosen, "we must again give research policy the importance it deserves." In the view of SPD research policy makers, that should also have an discernable affect on the research budget. According to Oesar Lafontaines' criticism of the government, "German unity is [still] not being reflected at all in the research budget." And still at the beginning of December at the SPD's science forum, Peter Glotz calculated that, since the beginning of the current government coalition, federal expenditures for research have fallen from 121 German marks per capita in 1981 to 97 German marks in 1992.

"If the research budget had grown since 1986 the way the federal budget has," an SPD paper on research policy says, it would "mean a sum of about 12.5 billion German marks" for the 1994 budget of Federal Minister for Research and Technology Paul Krueger. In fact, Krueger has only just 9.47 billion German marks at his disposal. Therefore, the Social Democrats want to increase the research budget by at least a "minimum" of one billion German marks.

The differences between the government coalition's and the SPD's ideas on research and technology policy are notably small in principle regarding the question of financing. Both are primarily concerned with improving the competitiveness of the German economy and improving living conditions.

There are, however, significant differences in the details. The Social Democrats want to again take up the nearly expired middle class assistance for senior citizens and make more money available for the transfer of technology. A significant difference is also their demand, which is supported by industry, for tax benefits for investments in the area of research and development.

At the same time the SPD wants to again take up the expired "Humanization of Work" program and direct more funds into the research and development of renewable energies and energy-saving technologies.

The SPD wants to decrease funding above all for basic research in large-scale research directions, for space flight and high-energy and elementary particle physics. The possibilities for intervening in the factors controlling human heredity would have to remain under federal control.

For the SPD, research has thus also become an "extremely important element in policy concerning the labor market and industry." "Social security benefits can only be safeguarded though the jobs of future generations," according to the Social Democrats' conceptualization of research policy. "Intergenerational commitments can be built only upon the new technologies."

EU Parliament Calls for Reversal of R&D Decline

94WS0184B Duesseldorf VDI NACHRICHTEN in German 3 Dec 93 p 4

[Article by Wolfgang Mock - "With Its Call For a Build-up of the Fourth General Program for Research and Technology, the European Parliament is Headed on a Confrontation Course"]

[TEXT]

The Ministers for Research and Technology of the European Union are Facing Tough Negotiations.

VDI-N, Bonn, 3 December 1993—Next Monday the European ministers for research and technology are meeting in Brussels. Their theme: the fourth General Program for Research and Technology for the European Union. There are not only difficulties in agreeing on content and financing. Now the European Parliament is also headed on a confrontation course and has called for an additional increase in money for research.

"We realize that we are on a confrontation course with our demands," Rolf Linkohr, the European parliamentarian, conceded, "but we cannot permit research in Europe to continue losing in importance." At Linkohr's suggestion, on the 18th of November the European Parliament called for 13.7 billion ECU (1 ECU = 1.92 German marks) for the fourth General Program for Research and Technology starting in 1994, 600 million ECU more than planned.

Next Monday in Brussels the European ministers of research and technology will attempt to find an answer to this demand. But they already failed at their last meeting in mid-October to come to an agreement either on the content or the financing of this fourth General Program for Research and Technology for the European Union (EU). Nor is their success on Monday in any way a sure thing. "The chances," according to a colleague of Federal Minister for Research and Technology Paul Krueger, "are fifty-fifty."

Three different ideas must be reconciled in the formulation of the fourth General Program for Research and Technology:

- The European Commission has requested 13.1 billion ECU calculated for the research and technology program from 1994 to 1998. The largest blocks go to information and communications technologies (I&C - 3,900 million ECU), industrial technologies (1,800 million ECU), life sciences (1,325 million ECU), energy technology (1,050 million ECU), fusion research (980 million ECU), and environmental research (970 million ECU).
- The European Parliament had originally agreed to this proposal but then on the 18th of November demanded another 600 million ECU. Of this, 400 million ECU should be added to research on nonnuclear energy carriers. In addition, the industrial technologies were supposed to go up by 300 million ECU and I&C technologies go down by 300 million ECU. Finally, the funds for the "socially oriented research" recently included in the fourth General Program for Research and Technology are also supposed to be increased from the previous 125 million ECU to 225 million.
- The European ministers for research and technology responsible for the financing of this general program have until now approved neither of the Commission's or the Parliament's ideas on content nor financing. Even among themselves they are still far from agreeing on the content and financing (see VDI-N 22/93, p. 3.).

That is why this coming Monday the ministers for research and technology will try above all to determine the amount of the total budget. While the majority of the EU countries either agree with the Commission's proposal of 13.1 billion ECU or even call for more, Krueger considers this proposal overspending. With his colleagues in the Cabinet and the Minister of Finance Theo Waigel in tow, he will therefore

try to keep the budget down to under 13 billion ECU. He has the influence to do it. After all, Bonn finances the Brussels budget and thus the fourth General Program for Research and Technology as well to a good 30%.

However, Krueger can currently count only on the British for support with his demands. They had already indicated in October that they did not want to go over 11 billion ECU. Krueger and his British colleagues cannot not be outvoted—unanimity is a requirement for passing the program.

For tactical reasons, according to the Brussels research manager, the Council of Ministers may remain with its budget proposal well under the 13.1 billion ECU proposed by the Commission. That gives the ministers the necessary playing room in the poker game with the Parliament, since it has the final say in approval of the program.

EU parliamentarians like Linkohr are, however, not counting on the Parliament being able to push through its demands for another 600 million ECU. "But," as Linkohr says, "we won't consider anything less than 13.1 billion ECU."

Call for Key Role for Technology in Europe

94WS0184C Duesseldorf VDI NACHRICHTEN in German 24 Dec 93 p 6

[Article by Martin Bangemann: "Research Policies Play a Key Roll in Europe's Structural Industrial Change, yet they must be Supported by a Broad Section of the Public"]

[TEXT] *VDI-N, Brussels, 24 December 1993-The European Union wants to give greater encouragement to technological innovations which will make a viable contribution to strengthening Europe's competitiveness, according to EU Commissioner Martin Bangemann in his following article.*

In recent years the European economy has lost a lot of ground in the technologies of the future. Japan's leadership in the high-tech sector seems almost unstoppable, and a similar lag in genetic and biotechnology compared with the USA is also taking shape.

While the European share of the world market in high technology was still around 25% in 1970, today it is less than 20%. In contrast, during the same period of time, Japanese companies have increased their share from 15% to 25%. It is therefore not astonishing that the number of Japanese patent registrations in the USA today is greater than those of all the countries of the European Union put together. Does this mean we are on our way to second class status in technology?

That is surely an exaggeration. European industry is still the world market leader in many areas, and no other industrial region has at its disposal such a highly developed industrial culture. But it cannot be overlooked that the trump cards of the past such as steel, automobiles, and chemistry are no longer, and new ones are not in sight. This leads to the question of where the new jobs will come from which are so urgently needed to compensate for the increasingly rapid dismantling of jobs in the old industries.

In this situation it is not enough just to appeal to European businesses and demand of them greater efforts in research to make European industry competitive. The most important thing is the creation of a climate favorable toward innovation, since throughout the European Union a whole series of complicated administrative and procedural provisions prevent private investments in the area of research. Therefore, it is completely understandable that increasingly more European firms are moving their research activities to countries where there are no such limitations.

There is a peculiar ambivalence in the public debate. On the one hand, the decline in jobs and growing unemployment are loudly lamented. On the other hand, technological innovations are resisted, and researchers are discouraged from translating the results of their work into competitive products. Those attitudes are not very compatible, but the political strength is lacking to expose the obvious contradictions and develop strategies which point to the future. Here we just talk too many things to death without thinking about the economic consequences.

We have to support technology and research policies in Europe more strongly than we have in the past. Our competitors on the world market are fully aware of the importance of federal policies on technology and research. While, for example, in 1991 the total expenditure for research and development in the European Union was only 2.1% of the gross domestic product (GDP) of the EU, the USA and Japan spent around 2.8% and 3.5% of their GDP to fund research and development. The amount of money spent is not in itself decisive in the results which are achieved. But it would be a mistake to deny any connection between investment capital and demonstrable success.

Therefore, with the Fourth General Program for Research and Technology we want first of all to strengthen the technological competency of the European economy. The continuing increase in the share of research expenditures within the Union's total budget indicates what importance we place on policies for research and technology—incidentally, in contrast to the member states which are more likely to be cutting back their research budgets as a whole.

There is a fateful tendency, especially in times of economic crisis, to use a great deal of money to support old industries which are no longer competitive. How many new jobs could have been created in recent years in Germany if the billions used for coal had been invested in research? Today this money is gone, without an end in sight to the coal subsidies—on the contrary. On 1 January 1994, the coal pfennig will actually be increased. An estimated 6.1 billion German marks will then be being spent just to preserve unprofitable German coal mining. We can certainly not improve the position of research in Germany in this way.

With the Fourth General Program we are gathering all the research efforts of the Union together in a single program, where we have to concentrate on fewer lines of research because of the relatively smaller share of our resources to all public research resources. This does not mean that we primarily want to support large individual projects as we did in the past. This action was not successful, as the

example of the high-definition television shows. We are rather concentrating on supporting generic technologies. These are technologies which have an important overlapping effect on various branches of industry. So the first area of activity for implementing programs for research, technological development, and demonstration forms the main focus of the program. The total budget for this area is to be around 17 billion German marks, the 7.5 billion mark bulk of which will go to support new information and communications technologies, and 2.5 billion marks will go to support industrial technologies.

The Fourth General Program for Research and Technology carries through an important change in the paradigm. While, previously, individual technologies were specifically promoted, especially those from which large companies profited, the emphasis now is on technologies which overlap multiple fields. This requires a different sort of implementation. The goal is no longer to identify tomorrow's winner, which due to the increasingly greater market dynamics and the increasingly swifter decline of technological competence, is also no longer possible. The point is much more to encourage technological innovations which conform with pubic priorities, innovations which make an effective contribution to strengthening the competitiveness of European industry.

One important focus must lie in the development of environmentally sound products and production processes as well as of intelligent transportation and communications systems. There can be no doubt that these are important problems for the future whose solution will be of decisive significance for competitiveness. Until now we have just been lacking comprehensive technological approaches which link strategically important goals with appropriate technological means in the solution of problems.

Our research activity will continue to be concentrated on the economically pre-competitive stage. We thereby take into account the demand from trade and industry itself which wants to avoid a distorting effect on competition as much as possible through market-oriented research. Yet research may not limit itself to basic research if it is supposed to lead to quickly practical results. It must become by and large "closer to the market", since it is only with new products and new production processes which reach the market quickly that we can maintain the competitiveness of the European economy. We can no longer afford to be world leaders in basic research while leaving it to our competitors in the world market to bring the results of our research to the marketplace. We are only wasting our resources by doing this.

We first need stronger networking to develop new manufacturing processes or to deal with public tasks more efficiently with the most modern information technologies. The new conceptualization of our support for research thus fundamentally concerns the development of "networks of excellence" among industry, science, and end-users, so that more and more information in word, picture, and sound can be exchanged with ever increasing speed and accuracy. The common priorities for research must be determined in close dialog with business and industry and above all must contribute to the purposeful dissemination of the results of research. The small and mid-sized businesses in particular will also profit from this, companies which often do not have sufficient means at their disposal to participate directly in our research plans. Only in this way can we make a contribution to reducing structural unemployment.

European policies on research and technology are making an important contribution to the structural industrial change in the Union. They cannot, however, bring it about alone. It first depends on society's ability to make a systemic change. Still, modern policies on research and technology can contribute in substantial measure to keeping jobs which are endangered and recovering those already lost. However, it is decisive here that the goals of our policies are shared by the majority of our citizens. For this we need information and solutions which are free of taboos. That is the prime task of the state in a highly developed industrial society.

German Research Society Sponsors New Research Areas

94WS0169B Frankfurt/Main FRANKFURTER ALLGEMEINE in German 22 Dec 93 p N4

[Text] Nine new special research areas will be established by the German Research Society (DFG) at the beginning of next year. Three of these projects will be assigned to biology and three to engineering; two pertain to the natural sciences and one to economics. Thus, from 1 January 1994, the DFG will be supporting 196 special research areas in 52 institutes of higher education.

"Signal recognition and transfer on cell surfaces" will be investigated by scientists at the Free University in Berlin, the Max Delbrueck Center for Molecular Medicine, and the Institute for Plant Genetics and Cultured Plant Research in Gatersleben. This is intended to clarify the molecular basis of signal recognition on the surface of cells, their transmission into the interior of the cell and reactions stimulated in the process. Inflammations, differentiation among embryos and the development of tumors are closely linked with signal transmission.

Researchers at the two Munich universities and the Max Planck Institute for Biochemistry in the same city will investigate the "molecular and bioorganic basis for secondary metabolism." Secondary materials are considered to be those which are formed by plants or microorganisms but which are not absolutely necessary for their metabolism. They are characterized by complex structures and are often used in pharmacy. Using modern techniques it is hoped to shed light on their mechanisms and to produce new therapeutically effective substances.

Scientists from the Max Planck Institute and the university in Goettingen are participating in the third biological project along with the Brunswick Technical University and the Hannover Medical College. Their subject area, developmental biology, has had an explosive career over the last 10 years: It has been possible, using new techniques, to identify those genes which control the development of an

organism out of an egg cell. Now the question is how the activity of the genes is regulated in a particular developmental program. Investigations in various animals ought to facilitate a general understanding of molecular strategies and blueprints in the animal kingdom.

Researchers from the Hamburg-Harburg Technical University and the GKSS Research Center in Geesthacht plan to concern themselves with an area of engineering which has been neglected in this country, the "micromechanics of multiphase materials." In view of the increasing need for innovative materials in industry, knowledge about the inner mechanism of materials is growing in importance. The behavior of metallic alloys, ceramics, or plastics must be known so that they can meet safety standards.

Two more special research areas in engineering have been assigned to the Aachen Technical College. Ergonomists, electrical engineers, and mechanical engineers will study "autonomous production cells." In the process systems should be developed which perform complex processes substantially independently and without interruption. Human beings should once again play an appropriate role in the factories of the future as "machine directors."

The heart of the "integrative material modeling" project is computer supported development of materials. Transcending the traditional classification of materials, the program ranges from the raw material to the finished components. The results will be important not only for basic research but also for business, since modeling is increasingly replacing expensive experiments in the production of components.

A third special research area is being set up in Aachen. This deals with "asymmetrical syntheses using chemical and biological methods." Too little attention has been paid to the fact that in chemical syntheses "chiral forms" arise as mirror images of a compound. These differ in their biological activity, e.g. in medications or plant protection. One of the forms is unnecessary or even dangerous. Thus techniques are being sought by which pure natural substances and hormones can be produced.

Scientists at Leipzig University will study "molecules in interaction with boundary surfaces." These surfaces control processes which are important in nature and technology and mark off functional spaces. Molecules change their characteristics when they come in contact with boundary surfaces and simultaneously have an effect on the behavior of the surfaces. The explication of fundamental relationships is important for new procedures in optoelectronics, sensorics, and informational technology, and also for medicine and environmental research.

Economists and mathematicians from the Humboldt University in Berlin will apply themselves to the "quantification and simulation of economic processes." In this study economic, mathematical, and statistical procedures are to be combined to evaluate the dynamics of economic processes.

Germany: Problems in State Subsidy of Research, Transrapid

94WS0201A Duesseldorf WIRTSCHAFTSWOCHE in German 17 Dec 93 p 134

[Article by Wolfram Engels: "Unmarketable Miracles"]

[Text]

Commentary

Measured in terms of domestic product, the U.S.A., Japan, and Germany spend about the same for research and development. The success is quite different. Referenced to the money spent, the Japanese register more patents than the Americans and the Americans more than the Germans. Using another indicator of success, the Nobel prizes for natural sciences, America is without peer. Then comes Germany while Japan has none. However, most of the Nobel prizes for Germans were awarded for research done in foreign countries and in foreign laboratories. Apparently, the Germans are good scientists but Germany does not provide them with enough development potential.

There is no international comparable data for the commercial success of R&D expenditures. However, there is no doubt that Germany would be an also-ran. The reason for the low German research productivity is apparently poor organization. The famous Japanese MITI brings the companies together around one table to discuss a joint project. If the companies are ready to use their own money together, the MITI makes available a relatively modest government grant in addition.

In Germany and in the European Union, this is done differently. The government awards research and development contracts, some of which it finances completely—Jager 90, Transrapid, high-temperature reactor, space travel, fusion reactor, etc. If the contractor for a project that is fully financed by the government is a company and not a government research institute, the company has every reason to generate costs as high as possible because the contracts are usually awarded on a cost-plus basis. This means, the higher the costs, the higher the profit for the contractor. On the other hand, it makes virtually no difference to the company whether the development leads to a marketable product. The company is earning money on the research and need not recoup the costs of this research by way of sales.

Transrapid is a beautiful example of the results of this. The government-financed high-tech means of transport has been traveling around in circles for years as fast as lightning on a track in Emsland that is 31.5 kilometers long. Under the stilts of this track, contented cows graze. Unfortunately, no one has yet seen fit to buy this miracle of German engineering prowess. Therefore, in a second step, the sales are also to be financed by the government. The government wants to build a track from Hamburg to Berlin for 5.6 billion marks. A consortium of private companies will take over operation, again subsidized in the form of tax reductions. Because it is just the nature of government investment projects that, at the end, they are twice as expensive as originally estimated; the taxpayers will, when

all is said and done, be asked to pay a few hundred marks per household. For this a reference track, which interested parties from the world over can view, will be available in the year 2004. The test track in Emsland was apparently too short.

You can just imagine how the story continues. In 2005, a Russian delegation appears. They want to use the Transrapid on the line from Moscow to St. Petersburg. However, the Russians have no money. Consequently, the federal government ensures an interest-free, non-repayable loan because otherwise the contract would go to the Japanese.

Many such stories can be told. The Airbus received government financing but cannot be produced profitably without additional subsidies such as inexpensive loans and dollar exchange-rate guarantees. The Ariane is a reliable booster but a commercial flop. The Russians and even the Chinese are cheaper transporting payloads into space. The high-temperature reactor swallowed a large portion of the budget of the Federal Research Ministry for years. Not a single one has been sold and the only commercial reactor in Hamm-Uentrop has been shut down by the North Rhine-Westphalian Land government—even though it was completely operational. The fast breeder reactor was even more expensive and just as unsuccessful.

Government support of microelectronics was a similar flop. Germany cannot defy Japan and the U.S.A. and cannot even keep up with South Korea anymore. Now, the government that has already paid for most of the research is also to subsidize production. You have not heard anything for two years about one of the most expensive projects, the fusion reactor. The government supported wind systems are, in the meantime, supplying a little power, but even then only because the electric power companies have been forced to purchase wind power at excessive prices. The goal of government research support is to provide innovative products that can be produced profitably in the high-salary country of Germany. The meaning is perverted if the production must also be subsidized.

The only reasonable strategy is to support research only where industry also assumes some risk with its own funds and therefore has an interest in marketable products. Then, the government need not care about the selection of projects any more. There was such a program in the form of salary subsidies for research plans of medium-sized companies. The program was overturned. That program could have produced something marketable.

CORPORATE ALLIANCES

European Affairs, Germany: Germany's Bundespost To Form Joint Venture With SES

BR0202124294 Alton INTERSPACE in English 7 Jan 94 pp 1-2

[Unattributed article: "The Bundespost Backs SES"]

[Text] Deutsche Bundespost Telekom has announced that it is to invest in Societe Europeenne des Satellites [SES] and form a joint company with SES to "promote the development of digital transmission technology in the areas of satellite and cable distribution for television and radio as well as for interactive services". The move, announced perhaps significantly on 27th December, when most European business was closed down, must come as a bitter blow to Eutelsat and its ambitions for Hot Bird Plus. As hinted at exclusively in Interspace last month, the mode involves one of Eutelsat's biggest and more progressive members backing its main rival.

The sums of money involved are not likely to be small; it is expected that the Bundespost will take more than 10 percent of SES's equity during the first quarter of this year. (However, it is not expected that it will have more than 10 percent of the voting rights.) SES will be expanding its equity base to accommodate the move and it looks as if the additional funding will be used as part of the financing for Astra 1f, a direct competitor to the digital Hot Bird Plus.

Moreover, the joint venture between SES and the Bundespost is likely to be set up in the first quarter of 1994 and will be used as a "development" arm to support manufacturers and broadcasters.

However, it is understood that Eutelsat's senior management are still looking at the implications of the Bundespost's planned investment and that there is a view at Eutelsat that it is not greatly significant for the future of the organisation. It is not the first time that such a move has happened; BT [British Telecom] during the late 1980s backed both SES and Eutelsat although no equity investment in SES was involved. It is believed that the Bundespost (currently the fourth largest user of Eutelsat) will continue to "support" the organisation. The SES move is seen as evidence that the Bundespost will not finance a second generation DFS Copernicus or TV-SAT replacement.

The Bundespost is also understood to be firmly behind the digital Hot Bird Plus project but the final decision of award of this contract (and hence its financing) is not due to be made until March of this year.

Nevertheless, the Bundespost is under financial pressure and it may yet become unwilling to finance a major part of the Astra system as well as Hot Bird Plus and Eutelsat III systems. The organisation will be faced with a massive investment in the next few years to convert its low capacity analogue cable networks to digital. This could cost between $3 billion and $10 billion. It is also believed that these cable operations are currently losing money heavily; some reports suggest as much as 500 million a year.

An open question now is whether the Bundespost intends to "pool" its current satellite capacity (three DFS Copernicus FSS spacecraft and one TV-SAT BSS satellite) with that of SES, offering the latter the possibility of capacity for non-broadcast services. SES has been looking for some time at entering the telecommunications marketplace.

France Telecom, Deutsche Bundespost Telekom Announce ECU1 Billion Alliance

BR2001095794 Chichester INTERNATIONAL TELECOMMUNICATIONS INTELLIGENCE in English 13 Dec 93 pp 1-3

[Unattributed article: "France/Germany - France Telecom/DBT Announce Global Alliance"]

[Text] At a press conference held in Brussels on December 7th, France Telecom and Deutsche Bundespost Telekom (DBT) confirmed recent speculation of a link-up between the two largest European operators when they announced a Memorandum of Understanding (MoU) to create an ECU1 billion global strategic alliance. The two companies said the alliance was "the result of an in-depth dialogue, during which both operators have gained a new vision of their long-standing partnership in a fast-growing market."

According to the MoU signed by the two operators, each will hold equal shares of the new company, as yet unnamed. Initially, the joint venture will build from activities transferred from existing entities of the two carriers such as Transpac and its European subsidiaries, and Datex-P in Germany. Other France Telecom entities, including some units of France Cables et Radio, and DBT units as well as EUNETCOM, the France Telecom/DBT value-added services joint venture, will also be transferred to the joint company.

The company will provide services to multinational companies. These will include X.25 switched data, frame relay and Internet Protocol (IP) services, as well as virtual private data network services, international end-to-end digital circuits, VSAT [very-small-aperture terminal] services, international virtual private voice networks, and other voice value-added services. These services will use a single backbone network and have common network management systems.

The company is scheduled to become operational in early 1995 when it will offer competitively-priced services, centralised billing, one-stop shopping, and global customer support. Products and services will be marketed under a joint brand name.

The new company will be headquartered in Brussels, with corporate offices and central operational units in France and Germany.

During its first year of operation, DBT and France Telecom expect the new venture to generate revenues of around ECU1.5 billion and to have some 4,000 employees.

The two operators said they viewed the alliance as a "major undertaking to provide a range of competitive, innovative, high-value services on a worldwide basis," and said that "access to the North American and Asia-Pacific markets may be achieved through cooperation with other partners." Negotiations are believed to be ongoing with AT&T of the United States.

Formal details of the new global alliance will now be examined by the European Commission which has yet to decide whether it falls under its jurisdiction. Most recently, the Commission said that it could not examine the proposed joint venture between BT and the United States operator, MCI, under its 1990 merger regulations because the deal was too small and instead would examine it under wider European anti-trust rules.

BT's Chairman, Iain Vallance, recently voiced his disapproval of the France Telecom/DBT merger. He believes that effective liberalisation and a regulatory regime which encourages European companies to develop new technologies to the best advantage can best be accelerated by a total freedom to compete for telecommunications services and customers across Europe and is dismayed that implementation of a European Commission directive insisting on full telecommunications liberalisation has been delayed until 1998, with exclusion clauses for some countries.

It is in this context that he disapproves of the prospect of the merger of DBT's and France Telecom's operations. If such a merger was allowed to take place before the full liberalisation across Europe, then it would simply constitute a firmly entrenched pan-European telecommunications monopoly that is totally at odds with the European vision of open competition in a single market, he said.

Announcing the alliance, the two operators said that all the activities of the new company are in sectors fully opened to competition and not subject to monopoly control. Furthermore, these activities will be pursued in total conformity with the rules of competition defined by the European Commission. They added that the arrangements would not compromise any existing bilateral correspondent agreements already established with all other international carriers.

DBT and France Telecom hope to receive EC Commission approval for the merger before the end of March next year.

Prior to the announcement confirming the alliance, the German Postal Minister, Wolfgang Boetsch, and Industry Minister Gerard Longuet of France, welcomed the European operator's plans and said that they did not infringe upon European competition rules.

In a statement, the German Postal Ministry said: "The plans should be seen against the backdrop of an alliance and partnership which could lead to a capital swap as soon as the legal status of the two firms allows it."

A date for the privatisation of France Telecom has not yet been decided, while the privatisation of DBT is scheduled to begin in 1995.

Announcement of the alliance came as European ministers were meeting in Brussels to discuss the European Commission's proposals for the liberalisation of the European telecommunications sector.

ABB Robotics, Renault Automation To Merge

94WS0128A Paris PRODUCTIQUE/AFFAIRES in French 20 Nov 93 p 1

[Article: "ASEA Takes Over Renault Robotics Operations"]

[Text] Its marriage with Sweden's beautiful Volvo has not even taken place yet, but Renault is already making eyes at the other Swedish beauty, ASEA [Swedish General Electric Corporation], which is going to take over its robotics operations and set up a joint venture. Renault Automation's robotics branch (ACMA, employing 350 and accounting for from 10 to 12 percent of Renault's turnover, which totaled 1.4 billion francs in 1992) is the leader in the French industrial robot market, but until now it has had only limited access to the international market. Its integration with ABB Robotics, the world leader, which had a turnover of $450 million (2.6 billion francs) in 1993 and faces such heavyweight competitors as Japan's Fanuc, Yaskawa, Matsushita, and Kawasaki, will enable the Swiss-Swedish group to strengthen its presence in the French market, notably by increasing its turnover fourfold to 360 million francs. The purpose of the joint venture, whose owners will be equal partners, will be to develop activities in the area of auto body assembly systems so as to offer turnkey automatic systems to automobile manufacturers and other industrial sectors. That market is growing steadily, and Stelio Demark, president of ABB Robotics, estimates that it is worth some $1 billion (about 6 billion francs). The agreement will put the Swedish group in a position to reach all of Renault's customers and some of Peugeot's as well. Although Renault will continue to manage their joint venture—which has now shifted its attention to special machine tools, automated assembly operations, and machining (in Castres)—for at least two years, it is a good bet that the powerful Swedish electrical engineering firm will not stop there. All of Renault Automation is likely to become Swedish, and Volvo, which is already one of the ABB's biggest customers, might help expand that cooperation. Getting rid of Renault's automatic controls subsidiary with its chaotic operating results has long been the French manufacturer's express wish. Selling Renault Automation piece by piece began with the sale of the April programmable robots to Merlin Gerin. Then it was the turn of industrial engineering, which was taken over by Dynatech. Lastly, a subsidiary of the Italian group Elsag Bailey—the DEA [San Giorgio Electronics Company-Institute for the Reconstruction of Industry]—bought the measurements branch last year. Renault then tried to reach an agreement to sell the robotics branch, whose turnover had dropped by almost half in two years' time (170 million francs in 1992), to Comau, a Fiat subsidiary. ABB Robotics, whose sales on the French market totaled 119 million francs in 1992, has long supplied automobile production lines with manipulator arms and other electronic controls. The result is that automobile manufacturers have long been its natural allies, and it is very dependent on them. The decline in investments in the automotive industry as a whole is making itself felt in the world robotics market, which is deteriorating steadily even in Southeast Asia, where the ABB already faces strong Japanese competitors.

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Dassault, Australia's Moldflow in Joint Venture

94WS0128B Paris PRODUCTIQUE/AFFAIRES in French 20 Nov 93 pp 2-3

[Article: "Dassault Systems Announces CAA Development Agreement With Australia's Moldflow"]

[Text] Moldflow and Dassault Systems have announced their CAA (CATIA [Computer Aided Three-Dimensional Interactive Applications] Application Architecture) development agreement. The two companies will integrate their engineering design and analysis products so as to offer CATIA users a complete analysis system for injection-formed plastic parts. The interface between CATIA and Moldflow makes it possible to analyze the flow of material during the injection and cooling of the part, monitor surface effects and weld lines, check shrinkage, and so on. The part is designed and meshed by CATIA before being subjected to Moldflow's specialized problem solvers. The analysis results are then displayed using CATIA's postprocessor. The development agreement provides the first solution for analyzing and simulating plastic injection in complete integration with CATIA, according to Francis Bernard, general manager of Dassault Systems. It also makes it possible to "optimize the design of injected plastic parts by simplifying the design process and reducing analysis times." Moldflow Proprietary, Ltd., established in 1978 and now the world leader in the plastics analysis market, develops and markets computer-aided engineering software specifically for the molded-plastics injection market. That technology, consisting of a combination of software and design concepts, has literally revolutionized the design of parts and moldings all over the world. The firm's headquarters are in Melbourne, Australia, with subsidiaries in Great Britain, Germany, Korea, China, and the United States employing about 100 people.

Contact: Moldflow (Andy Game), 259-261 Colchester Rd., Kilsyth, Victoria 3137, Australia. Telephone: 61/3-720-2088.

Dassault Systems (Martine Vesco), 24-28 avenue du General de Gaulle, 92150 Suresnes, France. Telephone: (1) 40-99-42-18.

DBP Telekom, SES To Merge Satellite Activities

94WS0193A Paris AFP SCIENCES in French 30 Dec 93 p 5

[Unattributed article: "DBP [German Post Office] Telekom-SES [European Satellite Company] Cooperation on Digital Transmissions Via Satellite"]

[Text] Paris—Deutsche Bundespost Telekom (DBP Telekom) and SES, which operates the Astra satellites, will create a joint company to develop the digital transmission of TV and radio programs via satellite and cable, the SES announced on 27 December.

In addition, DTB [Digital Television Broadcasting] will acquire an interest in SES "within the next three to four weeks," the objective being for DBP Telekom to eventually hold "15 or 16 percent" of the Luxembourg company capital, people at the SES head office in Betzdorf (near Luxembourg) indicated.

Luxembourg will remain the largest shareholder, through two public companies, the State Savings Bank and the National Credit and Investment Company, each retaining one third of the voting rights. The future company "will promote the development of digital satellite and cable transmission techniques for TV and radio programs and interactive services."

The SES intends to use digital compression on its two future satellites, Astra-1E and Astra-1S, to be launched at the beginning of 1995 and 1996 respectively. With 40 repeaters each, these two satellites will broadcast up to 400 TV programs. This range of new services will enable consumers to pay only for what they choose, or even to place orders directly by telephone through a modem.

CORPORATE STRATEGIES

Sweden: Ericsson Expected To Double 1992 Sales

BR0501130394 Chichester INTERNATIONAL TELECOMMUNICATIONS INTELLIGENCE in English 29 Nov 93 pp 19-20

[Unattributed Article: "Ericsson Expected to Double 1992 Sales"]

[Text] Ericsson reported pre-tax earnings of 569 million Swedish Kronor [SKr] for the third quarter of this year, representing a nine-fold increase on 1992's third quarter earnings of SKr63 million. For the nine months to the end of September 1993, pre-tax income reached SKr1,855 million, more than 15 times the Skr122 million recorded in the comparable 1992 period.

The net result was a SKr347 million profit for the third quarter of this year compared with a loss of SKr205 million in 1992. In the January to September 1993 period, net income was SKr928 million versus last year's SKr9 million.

Net sales rose 54.7 percent to SKr15,021 million in the quarter and 41.3 percent to SKr42,415 million in the nine-month period. Order bookings in the January to September 1993 period totalled SKr49,210 million which was SKr11,483 million more than the amount of orders booked in the same period in 1992. 1993's sales and order bookings were boosted by a decline in the exchange rate for the Swedish kronor and, if this was taken into account, Ericsson noted that the increase in net sales was 20 percent and the order bookings increase about 10 percent.

The United States is currently Ericsson's largest market, measured in net sales, followed by Italy, Sweden, and the United Kingdom. Over the past year, China's share of net sales has risen from three to six percent, which makes this country Ericsson's fifth largest market.

"Radio communications" is the product area showing the strongest growth and is now the largest of Ericsson's business areas, both in terms of order bookings and net sales. The sharp increase in net sales within this product group was mainly attributable to sales of mobile phone systems and mobile phones. Notable among the most expansive markets were China, Germany, and Australia. Order bookings also rose sharply, with large orders reported in China, the United States, Mexico, Germany, and Australia.

"Public telecommunications" reported third quarter and nine-month sales increases of 17.2 per cent and 15.6 percent, respectively, despite the divestment of the former operator activity in Argentina and the transfer of telecommunications exchanges for mobile telephone system to "radio communications" which took effect in January 1993. The increases were mainly attributable to Mexico, the United Kingdom, China, and Malaysia. Order bookings rose most in China, Spain, Australia, and Thailand. Important orders were also signed in Saudi Arabia and Lebanon. Ericsson's new switches for broadband transmission based on ATM [asynchronous transfer mode] technology have been ordered in Germany, Spain, Sweden, and Italy. SDH [synchronous digital hierarchy] for digital signal transfer has been ordered in Sweden, Denmark, the United Kingdom, Germany, and Switzerland.

"Business networks" reported strong increases in net sales and order bookings. This was mainly due to the consolidation of the Austrian company, Schrack. Major order bookings were recorded in Spain, Argentina, and the Philippines.

"Components" showed an increase in net sales following a number of deliveries of power equipment to markets in Germany, Spain, and the Far East.

The increase in net sales for "defense systems" was only marginally affected by currency rate changes, since most of the customers are based in Sweden. Order bookings were slightly lower than during the corresponding period in 1992 due to last year's substantial JAS orders.

Ericsson—Breakdown of Sales by Business Area (SKr millions)

	3rd qtr 1993	% chg 93/92	9 mths 1993	% chg 93/92
Public telecoms	5,069	+17.2	15,112	+15.6
Radio comms	6,242	+95.9	16,896	+81.9
Business networks	3,082	+64.6	8,713	+45.1
Components	1,380	+70.8	3,908	+22.9
Defence systems	477	+15.5	1,604	+16.4
Other	355	+31.5	1,084	+25.6
Less: Intersegment				
Sales	-1,584	+36.1	-4,902	+30.3
Totals	15,021	+54.7	42,415	+41.3

Ericsson - Breakdown of Sales by Geographic Area (SKr millions)

	3rd qtr 1993	% chg 93/92	9 mths 1993	% chg 93/92
Europe, excl. Sweden	6,576	+42.0	19,497	+44.0
Sweden	1,390	+19.5	4,303	+6.5
US and Canada	1,921	+33.8	5,471	+35.4
Latin America	1,866	+165.4	4,636	+45.9
Africa	81	-52.1	265	-43.6
Asia	1,953	+100.3	5,291	+109.4
Middle East	372	+117.5	982	+14.7
Oceania	862	+85.8	1,970	+43.4
Totals	15,021	+54.7	42,415	+41.3

Ericsson's investments in property, plant and equipment in the first nine months of this year amounted to SKr2,514 million compared with last year's SKr1,796 million. Of the totals, SKr1,796 million was invested in Sweden compared with SKr786 million in the comparable period in 1992.

Since the beginning of this year, Ericsson has increased its work force by 2,681 employees, bringing the total to 68,913 at the end of September 1993.

Ericsson expects pre-tax earnings for the whole of 1993 to be "somewhat more than double" 1992's SKr1,306 million level.

France: GEC's Takeover Refusal Puts Ferranti Into Receivership

BR0501144694 Paris ELECTRONIQUE INTERNATIONAL HEBDO in French 9 Dec 93 p 16

[Unattributed article: "Defense: GEC Renounces Ferranti Takeover"]

[Text] GEC has just renounced its takeover bid on the British defense electronics specialist saying that an examination of Ferranti's books had revealed a much worse financial situation than anticipated. GEC had offered one penny per share, or 10.1 million pounds (some 90 million French francs) in addition to taking over the Ferranti's debts, estimated at 140 million pounds.

Following GEC's withdrawal, Ferranti has been put into receivership. The receiver will try to sell off the company's assets in an attempt to pay off creditors. Operations may be sold off one by one, which would enable GEC or others to take over only the most attractive activities (for example, the sonar operation managed through a joint company with Thomson-CSF) without Ferranti's debts. During the first quarter of the fiscal year, Ferranti recorded a loss of 19.4 million pounds for revenues which fell by 17 percent to 91 million pounds and an order book worth 165 million pounds. GEC, for its part, has just concluded its first quarter with a 2.9 percent increase in revenues (4.38 billion pounds) and pretax profits totaling 360 million pounds.

Italy: Fiar Explores Market for Upgrades, Develops New Systems

MI0701151294 Milan ITALIA OGGI in Italian 3 Dec 93

[Article by Marco Tavasani: "Fiar Overcomes the Crisis in the Sector with Increased Foreign Orders"]

[Text] The strong contraction in military aircraft sales that is being felt all over the world has pushed Fiar (a Milan-based company of the Finmeccania group) to explore the new market of upgrading electronic equipment aboard fighter aircraft in the sector. This is a decision that the Italian company made about 10 years ago when the first signs of difficulties were being felt in the defense industry. This field is characterized by extremely long design schedules and full aircraft operations: it may take up to 10 years from the date the program is launched to the date of

installation on a jet. And the never-ending Eurofighter 2000 story is a wide confirmation of this fact. Therefore Fiar, anticipating the current market crisis, decided to invest in the avionic radar sector to upgrade a vast family of jets thereby lengthening the operational life of aircraft in an area (that of electronics) that characterizes a fighter aircraft, allowing it to compete almost on a par with more modern, but certainly more expensive machines. By pursuing and achieving this objective, Fiar ranks as one of the very few leading companies in this sector worldwide. Within the next 10 years these companies will share an international market currently estimated to be worth 15 trillion lire. The most recent Fiar success dates to a few weeks ago when Pakistan assigned the Milan-based company a 90-billion-lire order to upgrade the radars installed on its F7 fighter aircraft (the Chinese version of the MIG-21) with another 50-billion-lire option. And once again with Pakistan, Fiar is negotiating a new order to upgrade the Mirage line. However the electronic company marketing division is also negotiating interesting contracts with other countries in South-East Asia for the sale of a radar that derives from the Grifo model, also suitable for the U.S. Northrop F-5 fighter aircraft. Last year 76 percent of Fiar's orders came from overseas markets. This figure has permitted the company to cover a large part of the gap that comes from the national market whose budget is at survival levels following the constant cuts made by the last government budgets to the item on the upgrading of the Italian Air Force. This is a painful area for Italian companies, which have seen the third phase (of the six scheduled) of the order for the new AMX fighter-bomber aircraft (Alenia, Aermacchi, Embraer) stopped, without giving any go-ahead on the program to upgrade the jet with the Grifo X Plus radar.

Fiar is currently developing the ECR90 radar for the Eurofighter 2000 with the British company GEC Marconi Avionics, DARA [German Aerospace Agency] of Germany, and Insiel of Spain, with a 26 percent share. Moreover since June 1992 Fiar has been the leading contractor in an order for the development of the Pirate infrared system (once again for the new European fighter). It is an extremely advanced piece of electro-optical equipment which, thanks to a particular data and signal processing capacity, can operate either as a fighter radar or in an entirely passive way, that is, without emitting radiation that can be detected by enemy sensors, in addition to allowing pilots to fly in the most absolute obscurity without the aid of any external reference points. And in the final stage of this program Fiar will develop a system that will send the images from the infrared system to a visor on the pilot's helmet and present television-quality images of the scene scanned by Pirate directly in front of his eyes. These programs, combined with others such as those for space equipment and new sonars for the navy, enabled Fiar to achieve 225.5 billion lire in revenues last year with a 344.5-billion-lire portfolio of orders and 57 billion lire allocated for research and development. Even this year, business should reach 1992 levels, but with a stronger share of foreign orders.

Italy: Olivetti Establishes Telecom, Multimedia Division

MI0701151494 Milan ITALIA OGGI in Italian 3 Dec 93 p 13

[Article by Mario Salvatori: "Olivetti's Challenge Begins With OTM"]

[Excerpts] The news of the creation of Olivetti Telecom and Multimedia (OTM) is very important. It could change the future of Olivetti over the coming years and partially contribute to resolving the serious employment problem that is currently affecting the Ivrea-based company. For the time being talks with the trade unions concerning surplus employees have been suspended. According to recent unconfirmed statements this surplus is estimated to be 2,000 people. The attention now moves to what the Ivrea management is doing to give the general development trends for the immediate future. Olivetti like all the other major and medium-sized companies in the computer sector is currently experiencing a crisis.

[passage omitted] How is it possible to get out of this situation which appears to be one of no return. There are many answers: widening the consumer market, moving toward software, increasing consulting services, increasing services... One of the winning routes is surely that of integrating the computer and telecommunications sectors.

Today, TV, computers, and consumer electronics converge at a single point: the possibility of providing each of us with the information he needs (Stock Exchange quotations, soccer results, telephone conversations, client databases etc.) wherever we find ourselves and wherever there are archives containing this information. For the computer world combining computers with telecommunications is not an extra opportunity: it is the opportunity.

For this reason the formation of Olivetti Telecom and Multimedia is strategic: It is a real sign that Ivrea is well aware that this marriage cannot be avoided.

OTM is divided into four operational areas supervised by Olivetti Vice President Elserino Piol and led by Francesco Caio, formerly De Benedetti's assistant and director of company projects. The first area, Omnitel, is dedicated to mobile telephony. Omintel is the consortium led by Olivetti which is candidating itself to manage the European GSM mobile telephone system, a 1.5 trillion-lire business that could employ more than 2,000 people and which the trade union has paid a great deal of attention to over recent days.

The second area, Telecommunications Systems, comprises companies that have been operating in the data transmission networks and payment systems fields for years now: Sixtel and Sixcom. The Cambridge laboratories fall under this area, it is an extremely dynamic task force that in one way or another has been behind all of Olivetti's announcements in the telecommunications sector.

The third area, that of telecommunications services, includes Seva, which offers value-added services, and the Geonet network, a property network that can represent the basic infrastructure for the supply of outsourcing services to clients. The last area includes the Radiocor press agency and the newborn Opera Multimedia for CD-ROM development.

France, Germany: Eurocopter Reports 300-Million-Franc Loss in 1993

BR2101113094 Paris LA TRIBUNE DESFOSSES in French 20 Jan 94 p 11

[Article signed O.P.: "300-Million-Franc Loss for Eurocopter in 1993"]

[Text] Eurocopter CEO Jean-Francois Bigay is at a crossroads. The Franco-German company (Aerospatiale: 70 percent; Deutsche Aerospace: 30 percent) has just been through a 1993 fiscal year which would have been disastrous but for two last-minute military contracts with Turkey and the Netherlands. And Mr. Bigay opens the 1994 year with license agreements and an order for five Dauphin helicopters from Samsung Aerospace, hoping he will not have to implement a new streamlining plan.

In financial terms the helicopter manufacturer went into the red last year for the first time ever. The exact amount of the losses will not be known until April, but it should be close to 300 million French francs [Fr], including Fr250 million in depreciations and specific risk allowances. In 1992, Eurocopter earned Fr25 million. Its objective for 1994 is clearly to restore its financial balance. However, it will not be able to prevent sales from falling further this year. Sales amounted to Fr10.2 billion in 1993, a 10.5 percent decline. Another Fr800-million drop is expected this year, with sales falling below the Fr9.5 billion mark. Mr. Bigay's explanation is that "the world market for helicopters last year was the worst in 25 years, with 260 civilian and 285 military machines (not including two closed markets—the U.S. and Russian armed forces). Such a low level of orders had not been witnessed since the mid-1960s, with the exception—on the military side—of the year 1991, weighted down by the Gulf War.

Slight Reprieve

The Franco-German company did manage to capture 56 percent of the civilian market and to regain its average defense share (24 percent). Its order book totaled Fr9.3 billion and 166 helicopters, including 43 large ones. Ninety-five percent of orders come from abroad, with, among others, 20 Cougars for Turkey and 17 military Super Pumas for the Netherlands—a Fr1.4-billion contract. Thus Bonn and Paris will have only made a very limited contribution to the company's health.

Still, although the recent contracts will guarantee some activity for 1994 and part of 1995, Eurocopter badly needs another large order this year—about 20 Super Pumas worth Fr1.5 billion. The company is therefore hoping that France and Germany will agree to give it a hand should foreign orders fail to materialize in 1994. Indeed, it was only in the hypothesis that another large order was on the way that Eurocopter decided not to suppress more jobs, as it did in 1993 for 1,060 positions, cutting its total workforce down to 10,500. The Franco-German company would rather resort to short-term measures only, such as temporary unemployment; a gamble which it may need to reconsider in the second half of 1994 should market conditions keep deteriorating.

France Seeks To Penetrate Mideast Air Market

BR1801101294 Paris INDUSTRIES in French Nov-Dec 93 p 25

[Article signed Pierre Collet: "Saudia Airlines: The Wings of Desire"]

[Text] After Jedda and Abu Dhabi, and before returning to Paris, [Industry, Foreign Trade, and Telecommunications Minister] Gerard Longuet stopped off at the Dubai aeronautics salon, the third gathering since its creation in 1989. This was a particularly timely visit since a number of contracts, civil and military, are now on their approach run.

The "jumbo contract" will be for the partial renewal of the Saudia Airlines fleet, representing some 40 aircraft and worth in the region of 20 billion French francs.

The Airbus-Boeing race to win the contract will be ruthless. After Foreign Minister Alain Juppe and President Mitterrand, and before Prime Minister Edouard Balladur, it was Gerard Longuet's turn to discuss the deal with Saudi officials. For the Americans, President Bill Clinton personally telephoned King Fahd to inform him of the importance he attaches to this contract. It is true that Boeing, which has had to concede 70 percent of the market in this region to the Europeans from Airbus Industrie, is determined to catch up again. This is all the more true since the potential airliner market in the Middle East could be worth in the region of $28 billion between now and 2010.

Between 7 and 10 November, the 48 French companies present in Dubai, out of a total of 450, noticed that competition was increasingly severe, with the arrival of newcomers like South Africa and Romania.

Serge Dassault, president and managing director of Dassault Aviation [DASA] and chairman of the French GIFAS [French Aerospace Industries Grouping], took the opportunity to reiterate that "unlike the United States, we are not opposed to the transfer of any of our technology."

French manufacturers are ready to take off in the military market. Dassault Aviation hopes to sell Mirage 2000's, and in the longer term, Mirage 2000-5's, which Taiwan has expressed an interest in purchasing.

Eurocopter, a subsidiary of Aerospatiale and DASA, which has already sold 190 helicopters in the Gulf, would like to sell some fifteen Panthers to the United Arab Emirates, to compete with the British Lynx. The Cougar is also being offered to Kuwait and Saudi Arabia in competition with the American Blackhawk.

Lastly, Matra has sold the Mistral missile to Saudi Arabia, the Emirates, and Qatar. The company, headed by Jean-Luc Lagardere, is in the final stage of negotiations with Kuwait and Oman.

The coming year 1994 will reveal whether or not France has found takers for a share of this arsenal.

Germany: Siemens To Set Up Semiconductor Factory in Dresden

MI1201111694 Munich SUEDDEUTSCHE ZEITUNG in German 21 Dec 93 p 19

[Text] At a cost of billions of German marks, Siemens AG, Berlin/Munich, intends starting chip production in Dresden. A new semiconductor factory for computer memories and logic circuits will be set up in the Saxon capital, probably employing 1,200 people. A group spokesman confirmed that major investments are planned in microelectronics. But the details will not be announced until Federal Research Minister Paul Krueger is in Dresden on 23 December.

The construction of a microchip factory in Dresden was already under discussion about two years ago. When Siemens was looking at various possible sites to build such a factory, the then Federal Trade and Industry Minister Juergen W. Moellemann came out strongly in favour of the Saxon capital. But at the same time he refused "special financial support" for the project. As Siemens market researchers came to the view that sales of memory chips would decrease significantly over the next few years (because of their greater capacity), the Semiconductor Division was grappling with enormous losses, and the subsidy offered was not what the group expected, at the time Siemens put the project on hold.

Now a decision has evidently been made. According to a report in the magazine "BILD", a chip factory costing one billion German marks [DM] will be built in Dresden with a DM300 million government subsidy. It was further reported that DM2.4 billion will be invested at the Saxon location over the next 10 years. The Federal Ministry of Research and Technology will grant as much as DM30 million a year in subsidies to specific research projects at the factory under the budget heading "Microelectronics Research and Development." Siemens could, of course, also claim the normal investment subsidies available in eastern Germany.

The factory, to be built on a site close to Dresden airport, is initially intended for dynamic memory chips (the so-called DRAM [dynamic random access memory] semiconductors), but will later also make logic circuits, in particular customer and application-specific chips (ASIC [application-specific integrated circuits]). The memories will, so to speak, secure the necessary basic quantities of work, on which ASIC manufacture can then be built up. When completed, the factory will probably employ 1,200 people, 100 of them in the laboratory. The same number of jobs will be secured or created with future suppliers.

Siemens is understood to be seeking additional industrial partners for the new works. It will cooperate with the Dresden Microelectronics Center (ZMD), in which the Commerzbank AG and the Dresdner Bank AG, both of Frankfurt, have a holding, and which Siemens is already providing know-how, managerial staff, and orders. There is also the possibility of cooperation with a Fraunhofer Institute that developed out of the ZND's precursor company. Microelectronics could thus again become one of Dresden's major industries.

How far Siemens' proposed involvement in Saxony denotes a change in company policy in the semiconductor sector remains to be seen. Dresden is likely to make the 16 and 64 megabit memory chips. Under earlier plans, the former was to have been built with U.S. computer giant IBM in France. A new factory was not previously planned for the 64 megabit chip either. Instead, existing manufacturing plants were to have been adapted accordingly. But it seems that the chip boom that has resumed in the meantime has led to a rethink.

France: SGS-Thomson CEO Outlines Strategy

BR1002144694 Paris LA TRIBUNE DESFOSSES in French 9 Feb 94 p 8

[Interview with SGS-Thomson Chief Executive Officer Pasquale Pistorio by Marc Nexon; place, date not given: "SGS-Thomson Equipped To Take on The Competition"]

[Text]

[Nexon] How do you see the situation of SGS-Thomson?

[Pistorio] Today we have the answer to the question that was being asked seven years ago about the survival of the company: SGS-Thomson has managed to recover and has become a structurally-sound group. Debt has been reduced to less than $300 million from the $900 million of two years ago. Cash flow has been positive for two years now. On the technological front, today we have some undeniable advantages. At Crolles, near Grenoble, we have a plant the likes of which few groups in the world can pride themselves on.

In 1993 we moved into the world's top three producers of EPROM [erasable programmable read-only memory], one of our specialist products. We are also a world leader in mixed and power technologies. You may not know, for example, that last year SGS-Thomson filed 327 patents—one-third of the number filed by IBM and almost twice as many as were filed by the whole of the German microelectronics industry. That should be stressed. However, that does not mean we can now rest on our laurels.

[Nexon] What ambitions do you have for SGS-Thomson?

[Pistorio] The group must continue to grow faster than the market. If we want to hold five percent of the world semiconductor market at the end of the decade (currently we have 2.7 percent), then we need to increase SGS-Thomson's revenues by a factor of four. This is a major challenge, but one that we can meet. I am committed to making SGS-Thomson one of the 10 world leaders in this area within two years. On condition, of course, that we do not drop our guard.

[Nexon] What if there is another downturn in the market, as people are predicting, in two years' time?

[Pistorio] SGS-Thomson now has the means of remaining profitable. Even if the components market falls, we will remain positive. Our aim now is to increase our profitability over the average for the microelectronics industry. In 1994 our profits will, in principle, be better if the

favorable trend continues. If, on the other hand, the market takes a downturn in the second half, the situation will be different.

[Nexon] Do you intend competing with Intel in microprocessors and with the Japanese in dynamic memory (DRAM)?

[Pistorio] We are currently involved in the microprocessor business, but it is true that we are not active on the mass microcomputing market. We are currently seriously considering this option. We will make our final decision in the next few months. We do not want to rush into things because we are talking about a long-term strategy. To enter this market we could broaden our alliance with the American manufacturer Cyrix. Where dynamic memory is concerned, the answer is clearly no. There are too many competitors, and there is even competition in Europe. It is a vast market but it is not a strategic one today. It is possible to obtain a high level of technological know-how without gaining expertise in this type of component.

[Nexon] It is rumored that your public shareholders in Italy want to pull out...

[Pistorio] There is nothing that makes me think our Italian partners want to pull out. On the contrary, they should find the company's results rather reassuring.

[Nexon] So there are no new partners on the horizon, for example Texas Instruments or Motorola?

[Pistorio] None. Any conjecture about transferring a share of our capital to the Americans is quite unfounded.

[Nexon] Are you still assured of receiving the remaining $500 million for your recapitalization now you have returned to profit?

[Pistorio] That is a decision for the shareholders, but I am confident. It is precisely because they felt the full potential of the company that they released an initial slice of $500 million. Indeed, the performance of SGS-Thomson justifies new investment. In any event, to maintain accelerated growth we will need external financing.

[Nexon] People are also talking about a possible flotation on the Paris stock exchange...

[Pistorio] Our expansion and our profitability mean that we are going to need capital. The group's situation is likely to encourage investors. Today the conditions have come together in such a way that we can start to think about a flotation. Personally, I am in favor. I have made my views known to my shareholders, but it is they who will decide.

[Nexon] What about the $1 billion contribution promised by the French and Italian governments for R&D?

[Pistorio] The public authorities are giving positive signs about their desire to maintain the R&D effort. The actual sum will depend on the different projects put forward. We have to remember that this aid will on average finance one-third of the cost of the R&D for the group's main technological projects approved by the pubic authorities.

[Nexon] Can we expect to see a major European alliance for components, in particular with Siemens?

[Pistorio] We are open to all cooperation agreements. Moreover, we are working with Siemens in the context of the European research program JESSI [Joint European Submicron Silicon Initiative]. However, we should remember that our respective strategic interests are different, especially since we decided not to venture into the area of flash memory. Siemens has just made a large investment in Dresden (former East Germany), but we are not interested in participating. For our part, we are involved in a major R&D cooperation project in Crolles with Philips and the CNET (France Telecom). Managing such a program with three partners that big already requires a lot of work. For the time being, our agreements with Siemens remain on a case-by-case basis. The defense of the European electronics industry does not necessarily come through partnership deals.

[Nexon] How is your industrial restructuring program going?

[Pistorio] It is complete. Five years ago we had 22 factories. Today we have just 15 sites. However, we have a great need for new capacity. If we had had it last year, our revenues would probably have been up by 50 percent instead of by 30 percent. As a result, we will be deciding on fresh investment in the next six months. This year we must are to start building a new assembly plant in Asia, probably in China. Demand is burgeoning on the Chinese market. We will therefore also need to build at least two more distribution plants (modules) in the next five years, including one in the United States. Nor must we forget our investments at Crolles. Some $250 million has been invested so far, and an additional $150 million is currently being assigned. By the end of next year, a total of $600 million will have been invested on this site.

[Nexon] In which zones do you want to build up your presence?

[Pistorio] In 1993 our sales outside of Europe topped 50 percent of revenues for the first time ever. However, that is still not enough. Our aim is to reach 65 percent by the end of the decade by strengthening our position in the United States and Asia, where demand is very high. We generate $650 million in revenues with American customers. We hope this year to top the $1 billion mark. Our presence in Asia will also be strengthened through the development of our activities in Japan. Staff numbers should quickly rise to around a hundred.

[Nexon] Seven years after the merger, would you say that SGS-Thomson is now out of trouble?

[Pistorio] Absolutely. The company now has considerable resources including on the human level. Last year we took on 850 people in France and Italy, and we are continuing to recruit this year. The group is now capable of reacting quickly and of adapting to changes in the market while preserving its culture and warmth.

Pasquale Pistorio

"I still have some fifty or so years ahead of me," jokes this 58-year old Sicilian. At the controls of the French-Italian manufacturer for seven years now, this rotund and friendly man who despairs of ever finding a winning diet, does not intend hanging up his boots just yet. "He is boiling over with ideas for his group," a government representative said of him. His latest hobby horse is ecology. "SGS-Thomson must be the first company to eliminate CFC's from its products from 1996," he insists. Over the years, Pasquale Pistorio has won the respect of his shareholders. In his view, the European electronics industry deserves to be fought for, all the more so since "the Japanese have definitively lost their market leadership to the Americans."

Germany: 1993 Juelich Research Center Annual Report

94WS0208A Juelich JAHRESBERICHT 1993 in German Oct 93 pp 155-161

[Excerpts]

Title: Forschungszentrum Julich at a Glance; Table of Contents, Preface, Abstracts

Forschungszentrum Julich at a Glance

Name:	Forschungszentrum Julich GmbH
Operator:	Federal Republic of Germany (90%), State of North Rhine-Westphalia (10%)
Staff:	4,700, including 980 scientists, 70 professors
Visiting Scientists:	over 400 annually from more than 30 countries
Postgraduate Students:	400
Trainees:	370 in 20 professions
Area:	2.2 km^2
Business Volume:	DM 580 million, including internal earnings to the amount of DM 80 million
Bodies:	Supervisory Board (comprising six representatives of the partners, three elected members of the Research Centre's scientific and technical staff, three members of the scientific and business communities)
	Board of Directors
	Scientific and Technical Council (composed of heads of the institutes and projects, university representatives, elected members of the Research Centre's scientific staff, one representative of the works council)
Scientific Infrastructure:	research reactor; isochronous cyclotron; compact cyclotron; fusion device "TEXTOR" (tokamak); cooling and storage ring "COSY JULICH"; positron emission tomograph; biotechnical pilot plant; environmental specimen back; electron microscopy; laboratories for chemical and physical analyses; electronics and general technology; four large-scale computers; hot cells; a laboratory for crystal materials development; an isotope separator; a meteorological tower; clinic with 24 beds; central library with more than 900,000 publications, etc.
Technical Infrastructure:	workshops; print shop; photographic services; decontamination unit; radiation protection unit; heat supply unit; coolant supply unit; helium liqeufaction plant; fire prevention facilities; transport facilities, etc.
Scientific Publications:	approximately 130 Julich research reports annually in publication series of the Research Centre Julich and about 3,000 contributions to scientific journals and publications
Training:	approximately 100 apprentices and trainees accepted annually; opportunities for academic degrees and professional qualification; advanced training
Social Facilities:	welfare office; housing service; two canteens; lecture facilities; company sports facilities, etc.
Public Relations:	approximately 15,000 visitors annually; four Saturdays open to visitors; representation at ten fairs; 40 national and international conferences and workshops. Lectures at schools, public meetings and discussions.

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Preface

The Research Centre Julich (KFA) is a multidisciplinary research institution dealing with a broad range of topics and research activities of particular interest for the public. Its five research priorities structures of matter/materials research, energy technology, information technology, environmental precaution research and life sciences contribute to basic research and long-term programmes as well as to precaution research and key technologies. Interdisciplinary cooperation through and beyond the boundaries of specific areas of research is the basic concept pursued at the Research Centre Julich. Nevertheless, the KFA is not isolated, but maintains close cooperation with universities, other non-university research laboratories and industry, e.g., in the form of collaborative programmes.

This annual report is intended to present the various research activities of the Research Centre Julich to the public at large. A major portion of the report consists of popularized contributions based on work in the five main areas of research. Of course, they only highlight individual aspects of research, but they also illustrate the efficiency of cooperation beyond institute and division boundaries and demonstrate how concrete applications are derived from application-oriented basic research.

Interdisciplinary cooperation is indispensable especially in environmental research in order to explain the complicated interrelations prevailing there. Examples presented in this connection are the "Interactions between Biosphere and Atmosphere" and "Larix sibirica—an Archive of Climate Research." Progress in state-of-the-art medicine, specifically in medical diagnostics, is not conceivable either without cooperation between physicians, scientists and engineers, as is shown by the example "Tomographic Methods." The "Career of an Enzyme: From Analytic Reagent to Technical Catalyst" illustrates that life sciences also include industrial and product research. Further progress in information technology requires basic research over many years. Components can only be further improved and miniaturized today if the underlying structures are precisely characterized. A striking example is "Si/SiGe Semiconductor Heterostructures Investigated by Ion Scattering." Application-oriented basic research often provides concrete applications even on a shorter time scale, as can be seen in "Thin-Film SQUIDS Made of High-Temperature Superconductors." New findings in the field of basic research also depend on efficient experimental methods. "Optical Frequency Conversion and Nonlinear Laser Spectroscopy" is an example of new methods used in surface research.

Of course, a research centre like the KFA with its excellent infrastructure also demonstrates its efficiency by the construction and operation of large facilities. A milestone in this long-standing tradition is the new Cooler Synchrotron COSY inaugurated on 1st April this year and constituting a storage ring for ions, in particular for protons. COSY will be a unique facility in the medium-energy physics range for years to come, not least due to its good beam quality, and provide new insights into the structure of atomic nuclei.

This brief survey may illustrate that the Research Centre Julich will continue to contribute substantially to national and international research in the future despite financial constraints to be expected also in the next few years.

Abstracts

Examples of Research Activities

Research Priorities 1992

Structures of Matter and Materials Research

- solid-state research
- surface research and vacuum physics
- high-temperature materials and structural ceramics

Basic Nuclear Research

- nuclear physics
- nuclear and radiochemistry

Basic Research on Information Technology

- basic research on information technology

Interdisciplinary Analyses and Methods

- systems analyses
- data processing, mathematics, electronics
- chemical, physical, technical methods

Health, Environment, Biotechnology

- environmental research
- medical research and engineering
- biotechnology
- neurobiological research

Energy Research and Technology

- energy and environmental technologies
- exploration, recovery of fossil fuels
- high-temperature reactor technology
- waste management and safety

Nuclear Fusion

- plasma and wall technology, diagnostics

Research Priorities 1993

Structures of Matter and Materials Research

- nuclear physics
- sold-state research
- surface research and vacuum physics
- high-temperature materials and structural ceramics

Information Technology

- basic research on information technology
- data processing, mathematics, electronics

Life Sciences

- medical research and engineering
- nuclear and radiochemistry
- biotechnology
- neurobiological research

Environmental Precaution Research

- environmental research
- systems analyses

Energy Technology

- energy conversion technologies
- exploration, recovery of fossil fuels
- safety research, reactor technology and waste management
- nuclear fusion and plasma technology

Si/SiGe Semiconductor Heterostructures Investigated by Ion Scattering

Si/SiGe heterostructures are favourable candidates for new high-speed electronic and optoelectronic devices based on Si technology. The thermal stability of these structures is an important issue since high-temperature processing steps are often unavoidable during device fabrication. In this work, ion scattering was used to investigate thermal interdiffusion between the individual layers as well as structural changes. Interdiffusion between the layers of heterostructures was measured as a function of temperature and initial Ge concentration. Since the Ge lattice is about 4% larger than the Si lattice, Ge starts to grow in a strained mode on Si substrates. The distortion of the crystal lattice was measured by ion channeling along inclined directions. These measurements show directly the angular deviation between the inclined orientations of the alternating layers. Depending on the initial Ge concentration and layer thicknesses, these structures are thermally stable up to approximately 800°C.

Optical Frequency Conversion and Nonlinear Laser Spectroscopy

A newly developed high-power laser system producing widely tunable picosecond light pulses by optical parametric generation and amplification in lithium borate (LiB_3O_5) and silver thiogallate ($AgGaS_2$) crystals is presented. Computer-controlled rotation of these crystals which are pumped by the third harmonic (0.355μ m) and the fundamental (1.064 μ m), respectively, of a mode-locked Nd:YAG laser allows quick and continuous wavelength tuning of the generated light pulses from 0.41 to 12.9 μ m. The system is used for nonlinear optical spectroscopy of vibrational and electronic excitations at surfaces and interfaces. Examples of applications to vibrational spectroscopy of the hydrogen-terminated (Si(111) surface and to the spectroscopy of direct band gap transitions in a thin layer of strained Si at the Si/SiO_2 interface demonstrate the versatility of the laser system.

Larix sibirica—an Archive of Climate Research

Studies on the verification of atmospheric CO_2 concentration are of great significance for reconstructing the climate of past time epochs in addition to temperature history studies. A particularly important question needs to be answered in view of the current development: Does an increased CO_2 concentration lead to temperature increase or is an increase in atmospheric CO_2 concentration the consequence of increasing temperature? Besides isotope analyses on maar sediments and annual rings as well as organic geochemistry studies, the project *Isotope Geochemistry and Palaeoclimate* may serve to find an answer to this question. Palaeoclimate research can certainly contribute substantially to the assessment of future climatic developments.

Possible climate reconstruction by means of isotopic signals from annual rings of trees will be described, especially using the isotopic carbon data from a Siberian larch tree.

Interactions Between Biosphere and Atmosphere

The biological activities on the earth determine the composition of the earth's atmosphere. Some of the close interactions between air and plant, i.e., the uptake and release of reactive trace gases, are studied interdisciplinarily in an exposure chamber using sunflowers, tobacco and maize. Combined air chemistry analysis, labelling with the stable ^{15}N isotope and rhizosphere control permit a balancing of the nitrogen flows. The uptake of NO_2 is only limited by the slit width, whereas NO still has to cope with a resistance in the plant itself. After eight-hour exposure 80% of the ^{15}N from NO_2 is found again in the sunflower leaves (12% in the stalk, 8% in the root). Ninety-eight percent of the nitrogen is incorporated into the organic compound and utilized. Although this uptake only contributes a minor share to the nitrogen metabolism of a well-nourished plant, these flows are important for the chemical equilbria in the atmosphere. This also applies to the release of NO, preferably in the dark phase and with changing culture medium, as well as to the release of organic compounds. These volatile organic compounds can already trap ozone outside the plant.

Career of an Enzyme: From Analytic Reagent to Technical Catalyst

The formate dehydrogenase enzyme (FDH) plays a key role in nicotinamide cofactor regeneration. Cofactor regeneration is necessary if dehydrogenases are used for synthesizing chiral compounds of high enantiomeric purity from prochiral precursors. For FDH production

with the methylotrophic yeast *Candida boidinii* a continuous production process (fermentation and recovery) has been developed up to pilot scale: A high cell mass specific FDH activity (50 U/g) is achieved by process computer controlled supply of pure methanol to operate the continuous stirred-tank reactor (300 l) at an optimum methanol concentration of 10g/l. The achievable FDH space-time yield and FDH concentration are a function of the oxygen transfer rate of the fermenter. Isolation of the intracellular FDH enzyme was performed using extraction with an aqueous two-phase system (polyethylene glycol/ K_2HPO_4),FDH was achieved without any chromatographic purification step.

Tomographic Methods

Tomographic methods are used at the Research Centre Julich for a variety of applications. Two different groups of methods are employed. Firstly, transmission tomography where the distribution of the attenuation coefficients in a sample is determined and secondly emission tomography where the distribution of radioactive sources in a body is of interest.

For medical research, positron emission tomography (PET) is used in order to obtain quantitative information about diabolisms resolved in space and time. Positron emitting materials are injected and three-dimensional source positions are reconstructed from the measured gamma-ray emission. A similar method although with different physical parameters is required in order to determine the radioactive content of waste containers.

Transmission tomography is mainly used for nondestructive material research and quality control. Modern methods provide fast reconstruction and imaging of three-dimensional attenuation coefficient distributions in samples or workpieces. Spatial resolution down to a few micrometres is possible.

Thin-Film SQUIDs Made of High-Temperature Superconductors

$YBa_2Cu_3O_{7-x}$ films grown epitaxially on suitable substrates, appropriate "gentle" micropatterning methods, and a Josephson junction technology based on grain boundary engineering resulted in liquid-nitrogen-cooled superconducting quantum interference devices (SQUIDs) with attractive sensitivity. Magnetometers with a field sensitivity in the 100 femtotesla/$Hz^{1/2}$ range have been constructed using flux focusing. This sensitivity is sufficient to record human biomagnetic signals such as well-resolved magnetocardiograms. Auditorily evoked magnetoencephalograms have also been obtained. Nondestructive testing of materials is another area in which SQUIDs can serve a useful purpose, one example currently under investigation being the magnetic detection of fractures in steel reinforcements of concrete structures. An important task to be solved in this context is the reduction of interference signals by differential methods.

Germany: Mercedes-Benz 1993 Performance, 1994 Plans Presented

94WS0207B Paris LE MONDE in French 28 Jan 94 p 16

[Article by special correspondent in Stuttgart Eric Le Boucher: "With Sales Down Three Percent in 1993, Mercedes Looks for Cooperation With Other Automobile Manufacturers"]

[Text] "During the last two years, the automobile market declined faster than we could adjust; from now on, we shall lead the recovery." Helmut Werner, the new Mercedes-Benz chief executive officer [CEO], appointed in May 1993, has great ambitions. His company, a subsidiary of the Daimler-Benz group, will gain market shares in the future. Sales—down to 508,000 vehicles in 1993 compared with 522,000 the year before—are expected to reach 570,000 vehicles in 1994, and between 850,000 and 900,000 in 1998, at the end of the five-year plan started this year. Last year was difficult. The company lost money on cars and trucks (trucks were already losing money in 1992). Sales declined by three percent, to 64.6 million German marks [DM] (about 219 billion francs [Fr]). They should rise by five percent this year, reaching DM68 billion.

Cultural Revolution

In support of this prospect, Mr. Werner indicated that sales during the second half of 1993 achieved an annualized rate of 300,000, thanks to the Class-C compact car introduced last summer. Apart from that, Mercedes plans to expand its line with a van called Viano, a small convertible, an all-terrain vehicle to be manufactured in Alabama, and a Class-A "mini" to be introduced in 1997. Innovation in the product line is the first direction of Mr. Werner's strategy.

The second one is structural reform. Mercedes eliminated 11,000 jobs in 1993 and will eliminate another 8,000 this year. But this policy, in addition to "adding to the recession spiral," is wearing out. Mr. Werner explained that, from now on, they must take into account the productivity of capital, not just that of labor. In other words, machines must be made to work more efficiently. Mercedes will use three methods to achieve this end: relocation—one Mercedes vehicle out of 10 will have to be manufactured outside of Germany "in the intermediate term," compared with one in 50 at present; increased subcontracting (60 percent of components in 1998 compared with 55 percent now); and, finally, cooperation with other manufacturers. Mercedes is currently negotiating setting up plants in Korea and in India, in cooperation with the local group Tata.

This policy implies cost savings, which amounts to a cultural revolution at Mercedes where engineers used to rule the roost. The five-year plan was reduced by DM3.3 billion, down to DM 18.7 billion for investments and DM16 billion for research and development. Mr. Werner said he was confident as to the capacities of the German industry which, for the new age, "possesses greater potential" than its U.S. and Japanese competitors.

France's Cap Sesa Implements New Growth Strategy

94WS0175A Paris PRODUCTIQUE/AFFAIRES in French 30 Dec 93 p 1

[Article: "Cap Sesa Counting On PME's"]

[Text] With 1 billion francs[Fr] of annual revenue within the industry, representing 3.6 percent of the French software and computer services market last year, Cap Sesa Industrie is aiming at a six percent share of the market by the end of 1996. To attain its ambitious goal, in a context in which acquisitions are at a forced standstill, and in which double-digit growth is a thing of the past, this Cap Gemini Sogeti [CGS] subsidiary is banking mainly on a new organization and on a shift in strategy toward the most promising sectors in terms of growth. "Overall, French industry's spending on computerization last year totaled Fr92 billion, of which Fr29 billion went into software and computerization services alone," says Gerard Mezin, general manager of Cap Sesa Industrie. This figure can be expected to grow at an average rate of 8.6 percent annually, approaching Fr40 billion in 1996, and to represent approximately 35 percent of the industrial sector's computerization budgets. "With the big enterprises reducing their investments in computerization, the growth of the market is currently being fostered by the medium-sized industries." A Cap Sesa survey of the major industrial sectors indicates fields of activity that are still largely underequipped. The food processing industry devotes not more than one percent of its revenue to information processing, versus around 12 percent for the aeronautics and defense industries. The automobile, steelmaking, and petrochemical industries devote between 2.5 and 3.5 percent of their revenue to this need. Based on these findings, the CGS subsidiary has decided to shift to a new operational organization, effective 1 January 1994, involving market development units designed to sell to specific sectors and to centers of expertise specializing in a particular type of services or applications. This should enable Cap Sesa Industrie to better attack the market and occupy niches with high value-added potential.

Development of Foreign Markets Called Key to Europe's Future

94WS0147C Frankfurt/Main FRANKFURT ZEITUNG BLICK DURCH DIE WIRTSCHAFT in German 24 Nov 93 p 1

[Interview by Gordon Hewitt of the Manchester Business School by hfe., date and place not given: "'Europe's Enterprises Could Deprive Themselves of Their Future'"]

[Text] Frankfurt—Most of the enterprises in Europe still do not seem to know what international competition means, concludes Gordon Hewitt. To be sure, sales and production in international markets are part of the everyday picture for most medium-sized companies as well. But this is by no means participating in the global competition. For that reason, Europe's businesses could deprive themselves of their future if they don't change their way of thinking.

The organization of enterprises is much more oriented toward local conditions. But if global competition is misunderstood in this manner, even the most renowned producers could lose their position in the market. It is therefore important for the management to organize the company globally, which is far removed from "Develop and produce here, sell there." This global know-how does not involve merely the geography of the business activity but involves thinking past the edge of the national dinner plate. And in so doing, the question "Is our company even prepared for global competition?" unavoidably emerges. In order to create certainty, the company management should specify the way into the future and clearly define the goals. Pure financial planning would be no substitute for strategy here.

Of course, status quo is also not a guarantee for the future in global competition. A good position in Europe, for example in telecommunications, by no means results in a leading position in the international markets. European companies should quickly accept this fact, or else their domestic position will also be in jeopardy in the future. It is evident even today that, for example in the field of high technology, no European enterprise is any longer participating in shaping the future. "Sure, Siemens or Olivetti are very strong in Europe and help determine the markets. But the longer the distance from which one looks at the companies, the smaller their importance appears," says Hewitt.

Truly global enterprises, on the other hand, are present everywhere. And if you take that as the standard, you must also be concerned about the European automobile industry. A glance at the streets of Asia or America should correct Europe's judgement of itself. Not even the bastion of high-priced cars has held. The stylish European manufacturers have now clearly felt the quality-offensive from the Far East. Even so, the impression remains that many Europeans still have not grasped the situation in earnest. Hewitt thinks that the only chance is repeatedly to make it clear to those responsible that not only have the economic rules of the game changed, but that an entirely new game is now being played. This can be compared to England's situation in the postwar era; there, too, attempts were made to keep or further develop the old virtues and capabilities. This was the reason that the connection was missed. What remains is only nostalgia—such as for the auto names of Triumph or Aston Martin. Reversing this process is an urgent task for the management. There are enough examples of this as well, such as British Airways. This airline has a past as a totally insufficiently managed state-owned enterprise and is today one of the leading airlines in the world. The inertia in industry also led to new, innovative products no longer being created in the old companies, as the "garage manufacturers" at Sachsen Computer have repeatedly proved. "Part of the way the rules of the game have changed is also that strangers to the industry suddenly take up a production and do it very successfully," says Hewitt and refers to the conflicts between Nintendo and Atari in computer games, Toshiba and IBM in laptop computers and Canon with ex-champion Xerox in copying.

Germany: Siemens Confident of European Progress in Microelectronics

94WS0122C Berlin INGENIEUR DIGEST: WIRTSCHAFT & UNTERNEHMEN in German, Nov 93 p 32

[Article by Ulrike Scholz]

[Text]

Viewpoint: Europe can do it. Juergen Knorr, member of Siemens Corporation's board of directors and director of its Semiconductor Division, believes in a recovery of lost ground by European microelectronics.

In the eighties the German semiconductor industry suffered harsh losses in position vis-a-vis its American and Asian competitors. The cause are the work hours per annum: today 1519 h in Germany while 1857 h in the U.S.A. and 2007 h in Japan. The net labor costs are about the same in Germany and in Japan, in the U.S.A. 20% lower, but the supplementary labor costs are in Japan 37% and in the U.S.A. only 33% of what they are in Germany.

Manufacturing wafers for the 1 Mbit DRAM (Dynamic Random-Access Memory) in Germany thus costs 10% more than it does in the U.S.A. and 16% more than it does in Japan. In the nineties the European and especially German semiconductor industry has invested a great deal into holding its ground under such a pressure from abroad.

System engineering was expanded. Many innovations coming from Europe have found acceptance worldwide, among them the GSM mobile radio system and DECT cordless telephone Standard for which ASIC's (Amorphous-Silicon Integrated Circuits) had been developed.

Semiconductor enterprises in Europe underwent slimming cures. Production was tightened and wage-intensive operations transferred to Southeast Asia.

Collaborations were entered into so as to reduce the rising cost of new technological developments. An example is the agreement with IBM and Toshiba regarding the joint chip development.

If the European policy were to create conditions equally favorable for competitiveness, then an invigorated semiconductor sector could be supporting other sectors of industry with its innovations.

Germany: Research Called Essential during Industry Crisis

94WS0122A Berlin INGENIEUR DIGEST: WIRTSCHAFT & UNTERNEHMEN in German, Nov 93 p 31

[Article by Dr. Andreas Mueller, interviewer for INGENIEUR DIGEST]

[Text] **Interview: Many Chances in the Recession**

Prof. Dr.-Eng. Hartmut Weule, on the Daimler-Benz AG [Aktiengesellschaft = Corporation] board of directors responsible for research and engineering, warns against underestimating research during crises.

Q. You call for a different research policy in Germany. Why?

A. Although both government and industry pump a lot of money into research and development, there is no equivalent output in terms of innovations good enough to be entered into the world market. There is simply something wrong with the way research and development in Germany are being managed. For instance, assistance to medium-scale research is based on insufficiently strategy-oriented considerations while at the same time mission-oriented large-scale research facilities are engaged in too wide a range of tasks.

Q. Has, because of this, German research been knocked down?

A. No, there are downright very promising signs. I am thinking of the EC (European Community) Project AIT: "Advanced Information Technology in Design and Manufacturing" as an example. Spurred by Daimler-Benz, it could revolutionize the entire European Aero-Space Flight industry. Because it brings user and provider of information technology together during the development and production processes. Positive signs are also coming from the "Round-Table Microelectronics", launched by Siemens, IBM, Bosch, and Daimler-Benz as well as from the "Consensus-Group Production Technology." Innovative projects and research strategies regarding microelectronics and production technology in the application-oriented industry are being developed here by thinking 15 years ahead.

Q. But will Germany gain something from this during the very next few years already?

A. No. Especially in a time of crisis affecting both the economic boom and the business structure, however, it would be wrong to aim for better short-term results only. While the current strained economic condition creates problems, it also harbors good chances for the German economy.

Q. What chances?

A. One could apportion the research budgets in new ways and change the modality so as to soften up structures which have become rigid. Using its ASIC's (Amorphous-Silicon Integrated Circuits) in the indispensable key technologies such as microelectronics, Daimler-Benz plans to recover lost ground vis-a-vis Japan and the U.S.A. by way of international collaboration. In environmental engineering, moreover, we want to assume the top position from the very start. Wherever necessary we will enter into strategic alliances with other research partners. I am thinking here of energetics and space flight particularly.

BASF's Research Activities, Plans Noted

94WS0143C Duesseldorf HANDELSBLATT in German 6 Dec 93 p 11

[Article by Siegfried Hofmann under the rubric "Companies and Markets": "BASF AG/R&D Work Remains Steady at Around Two Billion German Marks [DM] in Spite of Recession - Innovation Processes to Become

Faster and More Efficient. 'Research Has to Be Strong Where Business Is Still Weak'"]

[Text] Ludwigshafen, Saturday-Sunday, 4-5 Dec 93 (HANDELSBLATT)—The BASF group will invest around DM2 billion in research and development again in 1993 too and thereby is emphasizing its intention of not neglecting innovation efforts even in a phase of dwindling earnings and tight resources. All the same, the changed economic and competition situation also has not left the chemical group's R&D divisions unaffected.

For instance, a number of organizational changes lie hidden beneath the since 1990 largely steady application of funds, BASF's head of research planning, Professor Horst König, states in a conversation with HANDELSBLATT: In the years since, BASF has turned heavily to the methods of project management with the aim of making innovation processes faster and more efficient. They include first of all clear agreements on goals, individual development steps and schedules. Planning itself takes place within the framework of a strategic performance target of the managing board based on individual suggestions from the fields of concentration ("bottom up"). At the same time the company has also for a short time been encouraging innovative behavior via an innovation prize for BASF personnel, which was awarded to two research teams for the first time a few weeks ago.

König sees the main concern of project management to be the speeding up of research projects. "Because in the chemicals industry time is more often than not more important than money." For him the importance of the time factor can be seen, for example, in the fact that today almost 10 years are required for the development of a new plastic, 12 years for plant protectives and on average 15 years for pharmaceuticals. As a result, a half-year's delay could already lower a project's overall profitability by up to 40 percent.

König blames a portion of these long development times on the especially time-consuming (and thereby innovation-inhibiting) approval terms and conditions in Germany. Just the thorough testing of a new substance in accordance with the law today requires around 1.5 years. However, because substances of this kind are often used as additions or intermediate products in a multistage process, this expenditure of time can easily build up. Hence, the aim of project management—which one could wish for the government approval process too—is precisely to lessen these delays also.

Concentration on "Core Knowledge"

More precise planning, project management and a more critical analysis of prospects for success have, says König, contributed to the fact that the number of individual research projects in the BASF group has been reduced since the end of the eighties from 800 to around 600 now. An additional reason for this was the more recent changes in the product portfolio. For instance, the retreat from the especially research-intensive field of concentration of structural materials.

However, König by no means wants to have anything to do with applying to research the motto of "concentration on core fields." Rather the goal here has to be concentration on "core knowledge," he says. He points out that dealing with new fields of concentration in the final analysis constitutes a prerequisite for the further development of a company.

BASF too would never have entered many of its major fields of concentration and would not have been able to find its present structure if it had concentrated its development activities instead on already strong fields of concentration. So, in principle research has to be strong precisely where one is not so strongly developed in business, König stresses. "All the branches cannot be cut off the tree, otherwise it will not grow."

How strongly the emphases and orientation change he illustrates by the example of BASF's four large central research facilities: For instance, the main laboratory today is regarded as a "life science" center (with a distinct emphasis on the field of research of pharmaceuticals and plant protectives and biotechnology). In the plastics laboratory there is an ever stronger move toward research on materials, while the color laboratory has been generally dealing with the optical properties of materials and has developed an emphasis in the field of "effector materials." In the ammonia laboratory (which traces its origin to fertilizer research) they are turning ever more strongly toward research on catalysts, which play a central role in almost all chemical production.

König rates the present basic structure of BASF's research as "solid and well adapted for the future," whereby, no doubt above all, efforts in the field of "life sciences" will be still intensified in the future. When the company is presently attending to developing a "vision" for all its research, so as by no means to create a sheer slogan, but to create a genuine leitmotif that presupposes a basic direction, without unduly restricting the researchers' creativity.

König expects that an important change in overall chemical research will above all be the fact that in the future one will in general have to turn far more strongly to system development. Thus, there will be increasing research in an integrated system, whereby chemistry will also act ever more strongly as a development partner for other industries.

Research in an Integrated System Gaining in Importance

While in König's viewpoint one can blame German chemical research for all told only a few failures (rather, he ascribes the industry's current problems to too rapid market changes), he recognizes a still substantial need to catch up in the area of transindustry cooperation in research. He refers to the fact that this kind of integrated research is already far more strongly established in Japan, for example, where a short time ago a 16-partner-strong consortium integrated its work under the guiding theme "clean car."

DASA's Plans to Cooperate, Cut Workforce Justified

94WS0144B Duesseldorf HANDELSBLATT in German 8 Dec 93 p 21

[Article by WIS: "German Aerospace: More Operations to Be Eliminated; 'Existence of Defense Technology Is Endangered'"]

[Text] Munich, HANDELSBLATT, Tuesday, 7 Dec—"If the defense budget continues to be used as a quarry in the Bonn budget, the only thing left for us to do will be to close down or sell off our defense technology." Juergen Schrempp, the chairman of the board of the German Aerospace Company (DASA) in Munich leaves no doubt that further cuts in the military procurement budget will seriously jeopardize the existence of the defense technology industry in the aerospace branch and once again place thousands of jobs at risk.

He said that DASA defense technology operations have already been cut back about 60 percent since 1990 and the workforce has been reduced from 16,000 to 9,000. Now many business sectors are already facing a "subcritical size." "After a certain point we can no longer maintain development and production capacities," Schrempp said. In some business sectors this point will be reached if the Defense Ministry actually cuts back the procurement budget, as planned, for 1994 from about DM8 billion this year to only DM5.1 billion. Since 1990 this budget has already been cut back 60 percent from DM18 billion.

But not only is it raining in on the defense technology division of the Daimler-Benz Company subsidiary in Stuttgart; the weak aircraft market and Bonn's policy of support for civil aircraft is making it hard for the aviation division to manage. Schrempp reported that an agreement concluded by the government with the United States two years ago enables the aviation division to continue to obtain indirect support through government contracts, but it reduces the direct support for development of from 80 to 90 percent of development costs that used to be customary in Germany by two-thirds. Indirect aid to compensate for this loss is not available here at all. Moreover, the existing already small appropriation in the budget for aviation of DM60 million for new projects has recently been cut back to DM16 million for 1994. "And this," Schrempp said, "after CDU [Christian Democratic Union], CSU [Christian Social Union], and SPD [Socialist Party of Germany] politicians had shortly before admitted that there had been omissions as far as the aerospace industry is concerned and promised to provide political aid for it."

Schrempp stressed the fact that the six plant closures announced in October and the reduction of personnel by a total of 16,000 to 70,000 is the minimum that is necessary under the present circumstances. He admitted that they should actually have begun to settle the matter of the all in all 52 plants (in connection with the merger with MBB [Messerschmitt-Boelkow-Blohm Company]) sooner. Another two plants, among them the one in Dresden with 600 employees, are seriously endangered. As additionally, reported, the personnel measures planned up to now alone will cost DASA about DM800 million for social contribution plans and compensation in 1993.

The consequence of the unpleasant basic conditions will not be that DASA no longer operates in the field of aerospace, Schrempp said, "but we don't know whether we'll still be operating in Germany." Even now many operations are only possible in connection with joint ventures—most of them with the French Aerospatiale. The following joint ventures and eliminations are planned:

- The whole guided missile division will be moved to the joint subsidiary, Euromissile (with Aerospatiale) with its main office in Frankfurt.
- The satellite division, which accounts for about 50 percent of DASA's space operations (2,000 employees), is to be brought into a joint venture (Eurosatellite) with Aerospatiale, probably with a German main office.
- There is also talk of German-French cooperation on military satellites.
- The 18-seat Dornier 228 propellor aircraft is being discontinued and is to be built only in China under license.
- The new 30-seat Dornier 328 will in the long run also be brought into a European joint venture.
- DASA subsidiary MTU [Motor and Turbine Union, Inc.] in Friedrichshafen (diesel engines) is to be transferred to AEG [General Power Company].
- DASA is withdrawing to a minority holding in microelectronics subsidiary Temic [Telefunken Microelectronics] (50 percent held by DASA and 50 percent by AEG).

Volkswagen Faces Losses, Looks to Rebound

94WS0172A Paris L'USINE NOUVELLE in French 2 Dec 93 p 29

[Article by Alain-Gabriel Verdevoye: "Germany: Car Manufacturer Announces Losses of Seven Billion Francs [Fr]; Volkswagen Has Enough Resources to Rebound"—first paragraph is L'USINE NOUVELLE introduction]

[Text] The announcement of heavy losses and the recourse to the 28.8-hour workweek came as a shock. But the European leader might come out stronger.

Car manufacturers are like politicians or show biz stars. The higher we praise them, the quicker we are to dismiss them. Only two years ago, observers raved about the forced growth of Volkswagen, the undisputed European leader; today, many promise it the fate of dinosaurs.

True, according to Ferdinand Piech, the German group is expected to lose Fr7 billion this year. True, the Wolfsburg manufacturer is forced to cut its workweek to 28.8 hours (instead of the present 36) in order to save 30,000 jobs. With a 10 percent wage cut. True, Volkswagen plants remained idle some 30 days between January and last October, Audi plants some 50 days over the whole year, and the Spanish subsidiary SEAT [Spanish Passenger Car Company] is operating in the red.

True, the group's production dropped by 16 percent during the first nine months of the year—as much as the European market. True, production costs are still 15 percent higher than those of French competitors. True, finally, investments over the period 1994-1994 will be 20 percent below the fantastic forecasts of the group's former president, Carl Hahn.

Yet, the position of the fourth largest manufacturer worldwide is in no way desperate. Having little debt, it launched a serious campaign last March to increase its productivity; it is known by the quite unpoetic name of KVP2. Already, 350 plants have been screened, with average competitiveness gains of 27 percent within just a few months.

The group's models still enjoy a good reputation of quality, and high-level technology. Besides, although it is hardly represented in the United States, Volkswagen is the most international of European manufacturers: it is strongly established in East Europe and, during the first half of the year, it achieved sales of 167,000 vehicles in Brazil, 64,000 in China, and 75,000 in the Asia-Pacific area. Today, the patient is suffering but after a long period of recovery it should come out still stronger.

All Indicators Point Downward

Period	Sales (Billion Francs	Net Result (Billion Francs)	Production (Millions of Units)
January-September 1992	220	+1.9	2.6
January-September 1993	195	-5.2	2.2

Renault Production Figures Down

94WS0172B Paris L'USINE NOUVELLE in French 2 Dec 93 p 46

[Unattributed article: "Renault Production Expected to Decrease by 25 Percent"]

[Text] According to a supplier, during the last four months of the year, Renault production should decrease by 25 percent compared with last year. In October, production was down 35 percent! In November, it will be down only 10 percent. In spite of successful sales, Renault is hard hit by the automobile market crisis. But that is nothing compared with the drop in truck sales: minus 50 percent in France in four years! As a result, RVI (Renault Industrial Vehicles) must eliminate 1,423 jobs out of a total of 15,500. All plants will be affected, except Limoges.

Germany: Government Support of Technology-Oriented Enterprises Discussed Successful Model

94WS0163A Berlin INGENIEUR DIGEST in German, Dec 93 p 36

[Article by Dieter Abendroth, BMFT (Federal Ministry of Research and Technology)]

[Text] **Successful Model**

Altogether 183 firms have so far been supported by the government in accordance with the BMFT"s "Assisting Technology-Oriented Enterprise Establishments" (TOU) model experiment. Jointly with the Information Service, the BMFT is devising a "program - implementation of assistance - founders of firms" sequence.

It is by means of the TOU model experiment that the Federal Ministry of Research and Technology (BMFT) aims to have technological enterprises established in the new Federal States. The assistance extends over the length of time it takes an enterprise to develop its eventually profitable product and thus over the lean initial period of its existence. Not only funds for product development but also advice on organizing an enterprise and raising private capital for product marketing are made available at that time.

By last August 183 such innovative enterprises have thus been assisted with a total sum of about 123 million DM. New top-notch workshops have been built. The results of earlier research done in the GDR (German Democratic Republic) are being successfully converted into novel products. So far most projects originate in measurement, medical, and processing practice. Next in numbers are projects in the fields of microelectronics, software tools, environmental engineering, optics, and biotechnology.

What has been learned from the model experiment is that the enterprise founders are by far highly qualified persons (see diagram). The distribution of enterprises among the new Federal States duplicates the distribution of previous research and industrial sites among them. At the top is Saxony, followed by East Berlin, and Thuringia.

Database Diagram (Pie Chart): 377 enterprise founders in second phase of approved projects:

1. no data available (8.2%)
2. others (no education, some study completed, military training) (5.0%)
3. professional education (technical, manual trade, business) (3.7%)
4. technician (1.9%)
5. graduate economist or industrial management specialist (1.1%)
6. graduate engineer, physicist, chemist, et al. (41.4%)
7. other degrees (2.1%)
8. engineering degree (36.6%)

Not surprisingly, there remain gaps in knowledge of and experience in industrial management and marketing techniques. The enterprise founders try to close these gaps by continuing their education or by measuring up to Western partners endowed with relevant skills. They are aided here by consultations with TOU-Project carriers and by seminars organized by them.

In the meantime, a great many thus assisted enterprises have completed their development stage and have begun marketing their products. A quite encouraging picture

emerges here: The first firms among them are slowly gaining a foothold on the German market and on the international market as well.

Germany: Government Support of Technology-Oriented Enterprises (TOU) Discussed. Tools and Development

94WS0163B Berlin INGENIEUR DIGEST in German, Dec 93 pp 36-37

[Article by Wolfgang Baier, VDI/VDE-IT GmbH (Association of German Engineers and Association of German Electrical Engineers - Information Technology Ltd)]

[Text] **TOU-ASSISTANCE Tools and Implementation**

1. Professional Support

To each enterprise founder the TOU-project carriers assign a team consisting of an industrial manager and an engineer or natural scientist. This team advises the founder during conception of the enterprise, during work on implementation of development plans, and during product marketing or production setup. The consultations are free of charge, but cannot be made available on an unlimited basis. The team members moreover arrange contacts with actual customers, potential customers, partners for joint projects, suppliers, and financial investors while also doing, if necessary, research on technical and marketing problems. Besides providing those free consultations, the TOU-Project carriers also conduct seminars which are specially planned to deal with problems relating to given enterprises and which require payment of a fee for custodial service.

2. Financial Support

Phase I. Conception. Work involved in conception of an enterprise is supported with nonrepayable grants-in-aid, toward expenses for necessary studies (market scope, technical feasibility, etc.) and for certification of operations management. The assistance covers 75% of these expenses up to 45,000 DM maximum. The enterprise need not yet be established during this phase.

Phase II. Development. The enterprise must have been established and its founders must be fully devoted to carrying out the development plan. Also during this phase they are assisted with nonrepayable grants-in-aid covering up to 80% of the expenses, but not exceeding the 800,000 DM maximum. A marketable product should be ready at the end of this phase.

Phase III. Marketing. During this phase the BMFT can underwrite TOU loans. The maximum amount of such a loan is twice the large as a concurrent loan from a Home Loan Bank, but will not exceed the 500,000 DM maximum. These loans do not require a collateral and are not subject to an interest markup so that the rate of interest on them is 3% below the market rate.

3. Implementation of Support

The application for support of an enterprise establishment is informally submitted to a TOU-Project carrier. The application must include a brochure containing all ideas and describing essential facts about the proposed enterprise. Following an examination of these brochure (which takes about four weeks), the TOU-Project carriers coordinate with the applicants the further enterprise conception procedure. This includes a time schedule, requirements for phase-I assistance, key items in the conception work, etc.

After completion of the conception work (within about six months), the application can be submitted for phase-II assistance. A decision by the BMFT is then reached within six weeks. Following the development phase (2-3 years), the enterprise concept is to be checked out and prepared for realization. Enterprises often require a second round of financial support, for preparation of product marketing. When necessary, TOU loans can now be applied for at the German Equalization Bank.

4. Assistance Representative: BMFT field office, Department 126 Hannoversche Strasse 30, 10115 Berlin. Tel. 030/3998101

5. Inquiries and Applications

VDI/VDE-IT Technology Center Ltd, TOU-Project representative, address: Potsdamer Strasse 12, 14513 Teltow. Tel. 03328/435280, Fax 03328-435141

For projects in the fields of biology, energy ecology: Juelich Research Center, Project Representative BEO (biology, energy ecology) Hannoversche Strasse 30, 10115 Berlin. Tel 030/39981-236 or 262, Fax 030/39981-318.

Germany: Government Support of Technology-Oriented Enterprises Discussed. Private Conversion

94WS0163C Berlin INGENIEUR DIGEST in German, Dec 93 p 37

[Article by Klaus Beumler, technology consultant at VDI/VDE-IT (Association of German Engineers and Association of German Electrical Engineers - Information Technology Ltd)]

[Text] **Privatization.** With the help of business contacts, the Velox Automation Ltd is finding the direction to the profit zone in West Europe 1994. Established in 1990, this new technological enterprise employs already 13 workers.

"Direction to profit zone has been found" say ex-officer Wunderwald.

The family of products offered by the team of ex-officers includes special sensors for operation in intricate and extreme environments, also robust but efficient measuring instruments as well as control and regulation engineering devices. The new developments, registered under the trademark "Velomat", utilize the latest knowledge and experience concerning error-tolerant networks and simulation of complex sensor or actuator fields.

The founders of this enterprise located at the Brauna in Saxony had previously worked in the Department of Scientific Instrument Design at the Officers' College in Kamenz. Reinald Wunderwald, the guiding spirit of the founding foursome, did not want to wait till others would decide his professional fate. He aroused in his friends

enthusiasm for establishment of an engineering office: "We should be able to successfully apply our technical know-how and team spirit to production of civilian goods."

The four of them plunged into preparatory theoretical work and then let an enterprise consultant help them with the financial concept. After the Velox Ltd had finally been established in spring 1990, there followed usual difficulties: aggrevation with hesitant bankers and attendance in many places at the same time. Simultaneously with the development of a salable product line, there also had to be built up a core of customers.

During this difficult phase the Velox team made contact with the VDI/VDE- Technology Center for Information Technology. The offered TOU (Technology- Oriented Enterprise Establishments) assistance program was gratefully accepted and subsidies were quickly approved. Meanwhile, the Velomat product line has grown to include 20 items and more are being developed. Stimulation for this is now already provided by the expanding core of customers.

This TOU assistance provided the foundation for dynamic evolution of the Velox Ltd from an engineering office into a manufacturing enterprise. "The program has helped us a great deal" says Wunderwald. He does not hide, however, that arriving so far has required quite a lot staying power. "We relied too much on the East German medium-size industry." The recession in machine manufacturing in the old (East German) States created gaps in the original conversion plan.

The management team of this enterprises, which had already grown to a staff of 13 employees, was helped by business contacts in Austria, France, and the Netherlands in overcoming those deficiencies. "The present status of orders indicates that next year we will have reached the profit zone" joyfully announces Wunderwald.

Germany: Future of Research, Development

94WS0162A Berlin INGENIEUR DIGEST in German Dec 93 p 20-21

[Article by Stefan Willeke: "Fractal Research"]

[Text] The Ingenieur Digest (ID) interviews Prof. Dr. Hans-Juergen Warnecke, the new president of the Fraunhofer Society, about the future of German research and his specialty—factory organization.

ID: How do you see the special place of the Fraunhofer Society within the German research community?

Warnecke: We are actually a service operation for society and the economy. The special mission of the Fraunhofer Society is to bridge the great gap between knowledge-oriented and result-oriented research. Consequently, our researchers ought not be viewed simply as scientists but as salesmen and entrepreneurs as well.

ID: That sounds like an excerpt from your book The Fractal Factory. What do you intend to change in the Fraunhofer Society?

Warnecke: A new man at the top always does things differently because he brings in a different mentality. But not just for that reason alone. Conditions have changed for the Fraunhofer Society. I shall therefore strengthen the promising decentralized structure and management of the Society. The 50 institutes that we have, including those in the new federal states, operate as independent profit centers in their own specialty. They have to market accordingly and constantly monitor their own efficiency.

ID: The knowledge-oriented and result-oriented research dichotomy you refer to has been much discussed. How do you view the relationship between basic and applied research?

Warnecke: Basic research, as always, is very important. We need basic research knowledge upon which to build, without, however, being under the constant pressure of seeking applications and uses. The question really is just how much basic research and how much applications research we should undertake. It is my opinion that applications research should, owing to current innovative weaknesses and the great need for quick innovations, receive the greater emphasis.

ID: Do you welcome this development.

Warnecke: There is no other choice for me. I don't want to start an allocations war. That would be ridiculous. We must—in view of limited resources—set priorities sensibly within a cooperative dialogue with the political, scientific, and economic sectors.

ID: In your book, you ridicule the slavish copying of Japanese production models. What do you propose instead?

Warnecke: We have to develop our own concepts as how to organize, structure, and manage conpanies in Germany. The question today is to survive in a climate of increasingly more intensive global competition and under increasingly turbulent conditions. We cannot do that if we must first wait for some new message of salvation from Japan before getting up off our duffs.

ID: Perhaps, the reason for this is that we do not have a salvation plan of our own. What, then, specifically has to be changed in the German business world?

Warnecke: It must constantly be in a position to react swiftly to new surprises emanating from the customer and from the competition; innovations must become routine. A single production process is no longer decisive for maintaining competitiveness in such a changed situation. Rather, communications and information exchange between the various specialists must be perfected. In this way the logistics—in the broadest sense—will be made available for the successfully breaking bottlenecks. This is why German industry has suddenly found itself is such difficulties.

ID: You therefore propose "fractals," that is, relatively independent operational entities, as the solution How would that function in practice?

Warnecke: In the following way. I view a particular company undertaking and proceed to engage a number of subcontracters to carry it out. I find them in our own business. Each associated group can be viewed as an independent subcontracter to whom I assign a specific target goal. In the ideal case, each individual associate knows his own target goal. Besides the targeting system, a navigational system is also needed. Each associate has to know precisely where he stands with respect, for example, to processing times, defect rate, and costs. These are the data that determine the difference between the specified planned state and the actual state of affairs. We hope—and various projects have given us reason to hope—that a motivational thrust will ensue from the difference between the specified and actual states so that the process continually improves itself.

ID: Isn't there a danger of the subcontractors becoming too independent?

Warnecke: I don't think so. The overall organization ought not become chaotic. We shall—as before—have a top management team, but with the flatest possible hierarchy.

ID: Is management ready for this?

Warnecke: Of course there will be a learning process. It is simply not going to be the case that the individual fractals, the business entities, or cells—it doesn't matter what you call them—will only be established and structured from top management once, and then left to be. Further improvements will be made whenever deficiencies or problems are detected. The system will have its own dynamic. We are bringing the customer-supplier relationships together in an internal competition.

ID: Please give an example.

Warnecke: Take, for example, the present maintenance field. As a supplier to the production field, it had to be understood as a subcontractor. In future, it will no longer have a fixed budget with a fixed number of workers. Instead, it might be decided that you will only be budgeted on the basis of half the number of your staff workers. The other half you will have to earn by performing services and jobs for which the production groups or fractals contract you.

ID: In developing such model factories, do you have any specific examples in mind?

Warnecke: There have been and continue to be companies that already practice this. Science is lagging behind. One example that comes to mind is the Mettler-Toledo Company in Albstadt. It was brought to my attention by someone who had read my book and said that he had seen my "fractal factory" in operation there.

ID: Have you found any emulators?

Warnecke: Yes, in the meantime there have been small to medium-size companies that are attempting to do the same. But any one who attempts to do this must be fully aware that you simply cannot buy an organizational structure. You have to find your own specific solution.

ID: After the collapse of entire industries, the East German enterprises are in particular need of structural solutions. Does your concept offer any hope in resolving these immense difficulties?

Warnecke: It would be presumptuous of me to claim that those very special problems could be eliminated in this way. But there is a certain harsh advantage in starting from point zero. In some ways, it is simpler than attempting to introduce changes in a matured West German organizational structure. Out of necessity, that is now being attempted with brute force. There are some opportunities for it in the eastern states.

ID: Are they being taken advantage of?

Warnecke: Opel has introduced a policy change in its Eisenach plant. A manager also wanted to show me a factory in Mecklenburg-Vorpommern, a branch of the Pfanni Company in Munich, that was operating on my principles. The manager told me that he had actually structured his plant contrary to instructions from Munich, with the strong support of the workers.

Professor Warnecke has headed the Fraunhofer Institute for Production Technology and Automation; he is a member of the management boards of various institutes and companies; and he teaches at Stuttgart University. By virtue of his books and 400 professional publications, he is considered the pope of factory planners.

Germany: Technology Potential, Research Requirements of Bavarian Industry

94WS0181A Munich TECHNOLOGIEPOTENTIALE UND FORSCHUNGSBEDARF DER BAYERISCHEN INDUSTRIE in German 1993 pp 1, 3, I-III, IX-X, 153-157, 161- 165

[Foreword, table of contents, summary, table and bibliography from report by Eberhard von Pilgrim and Wolf Rüdiger Streck, "Technology Potential and Research Requirements of Bavarian Industry," IFO [Institute for Economic Research] Studies for the Industrial Sector, No 44, IFO, number of pages not available; foreword by Dr. K.H. Oppenländer, professor and president of IFO, Munich, September 1991]

[Text]

Foreword

In advanced industrial countries the production of knowledge and the turning of this knowledge into innovative products and manufacturing processes are decisive for growth and prosperity and determine the importance of countries in international politics. Japan has proven to what extent this is possible. Bavarian industry too has been able in recent decades to strengthen its position in the international innovation competition. But, considering the dramatic shifts of emphasis in world markets because of Japan and the emergent industrial nations in East Asia, one asks the question what is to be done to maintain Bavarian industry's position and to strengthen it further in the coming decades.

Against this backdrop the Bavarian state government's scientific and technical advisory board commissioned IFO to analyze Bavarian industry's strengths and weaknesses in individual fields of technology, to reveal growth opportunities for Bavarian industry with alternative scenarios for the future, and to work out points of departure for Bavarian research and technology policy for ensuring and strengthening Bavarian industry's innovation might.

The study was made in 1991 by the industry and structure department (then headed by W. Gerstenberger). The analysis is based for one thing on making use of the data on world R&D output prepared by IFO's patent statistics department, and on another on interviews of high-tech companies as well as of scientists and engineers at universities and government research institutes. The people in charge of the research project were aided by Eberhard Buckel, who performed the extensive computations for the analysis of international patent statistics, which are documented in detail in a table appendix. The interviewees' willingness to be interviewed at length was a prerequisite for the study's being done. The people in charge of the project would like to express their heartfelt gratitude to the participants for this.

The study could not be published till now, after the scientific and technical advisory board developed recommendations for further action based on the study and presented them to the public at the end of 1992.

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The Most Important Results in Brief

Bavarian industry has strengthened its position in the Federal Republic of Germany in recent decades and in so doing has concentrated on aerospace, motor vehicle manufacturing, the electrotechnical and electronics industry and machine manufacturing as emphases.

German inventors are generally doing well with third place in the international innovation competition. Strengths (environmental engineering, transportation engineering, chemical engineering) and weaknesses (electronics, data systems and communication technology, biotechnology and genetic engineering) show here. Bavarian research holds an above-average position within Germany in almost every field studied. This is especially pronounced in laser and superconductor technology and power engineering, but also in electronics and data systems and communication technology. Diverse non-industrial research activities pepper the research fields forming the basis of this study.

The picture of future research requirements is based on three scenarios (the affluent information society; environmental problems; East-West and North-South tensions) and their effects on specific fields of application of technology and on spheres of life. These seven fields are data systems and communications, the environment, energy, transportation, agricultural production, medicine/health, and security and defense.

Metrology and control engineering will gain in importance from various viewpoints in the future, resulting in corresponding research requirements in the fields of electronics, optronics, sensor technology, micromechanics and microsystem engineering. The field of data systems and communications likewise requires research in electronics, optronics and photonics—specifically: new compound semiconductors, three-dimensional components, optical waveguides, systems for optronic or photonic data processing, microsensor technology, and microsystem engineering.

There is a great demand for research in laser technology and superconductor technology, for which tremendous application potential is in store if high-temperature superconductors can be used in practice.

The field of materials, including surface and thin-film technology, is likewise a research field of a crucial nature. Materials for electronics, engineering ceramics, lightweight construction materials, high-temperature materials, functional polymers, composite materials and biological polymers are important research directions with a great demand.

Public health, agriculture and ecology need research results from biotechnology and genetic engineering. Protein, peptide and enzyme research, microorganisms and genome decoding are the keywords for research directions.

A research policy priority for the field of data systems and communications is to be inferred from the scenario-influenced trend in various fields of application of technology. The structure of Bavarian industry provides a good basis for this. This prioritizing includes microelectronics, optronics, sensor technology, micromechanics and microsystem engineering as well as the materials possible in each case. It also includes the development of more powerful computers and corresponding software.

In addition, research emphasis should be placed on the fields of photovoltaics, hydrogen technology and recycling—especially of electronic equipment—and on certain research fields in biotechnology and genetic engineering.

Table of Research Fields (Processes and Fields of Application) That Are to Be Included in the Analysis

Materials and Process Level	Application Level
Electronics	
Silicon technology, compound semiconductors	Computer architecture
Chip-making processes (x-ray lithography)	Data processing
Component development (vacuum microelectronics)	Computer-integrated manufacturing (CIM)
High-performance processors	Information systems for motor vehicles
Data storage	Information systems for aerospace
Software development processes	Entertainment electronics (new television and radio equipment), other consumer electronics (home electronics)
	Microsystem engineering
	Control and instrumentation technology
	Medical technology
Optoelectronics and Photonics	
Switching (couplers, transducers)	Optical communications engineering
Data storage	Optical data processing
Amplifiers	Photonics in vehicle manufacturing
Transmission technology (optical fiber technology, separating filters, microoptics)	Computer networks
	Optronic instrumentation
Sensor Technology and Micromechanics	
Optical sensors (microoptics)	Medical technology (implanted devices)
Semiconductor sensors	Bioengineering
Biosensors	Environmental engineering

Table of Research Fields (Processes and Fields of Application) That Are to Be Included in the Analysis (Continued)

Materials and Process Level	Application Level
Mechanical and ultrasonic sensors	Microsystem engineering
Chemical sensors	Control and instrumentation technology
Electroviscous fluids	Industrial process engineering
	Robotics
	Sonar technology
System Engineering and Microsystem Engineering	
Micro-electronics, -optics, -mechanics, -sensor technology	Medical technology
Nanotechnology	Aerospace
	Robotics
	Optical communications technology
Laser Technology	
Types of lasers, including semiconductor lasers	Information carriers (including metrology)
	Spectroscopy
	Medical technology
	Machining (cutting, welding, surface treatment)
Superconductor Technology	
Superconducting materials	Magnetic levitation technology (maglev railways)
Manufacture of superconductor products	Electronics
Building services (cooling technology)	Signal and data processing
	Energy supply and distribution
Materials Sciences and Materials Application Technology	
High-tech ceramics (superconducting ceramics)	Sensor technology
Metallic, light-construction and special materials	Optical signal technology
High-tech polymers	Superconductivity
Biodegradable polymers	
Semiconductor materials	Electronics
Composite materials (fiber-reinforced materials, polymer-matrix, hybrid composite systems)	Medical technology, aerospace
Carbon materials (C60)	Engine technology
Glass and optical materials (including nonlinear optical materials)	Optical and precision mechanical industry
Power metallurgy (close-to-finished workpiece fabrication)	Biotechnology, separation technology, chemical technology
Amorphous materials	Motor vehicle manufacturing

Table of Research Fields (Processes and Fields of Application) That Are to Be Included in the Analysis (Continued)

Materials and Process Level	Application Level
Structure and texture	Technical textiles and formed fabrics
Materials testing and quality assurance	Machine manufacturing
Microscopy	
Material development theory	
Jointing technology	
Refrigeration engineering	
Recycling, waste disposal	
Microgravitation	
Surface and Thin-Film Technology	
Coating processes (CVD, PVD, MBE, laser ablation, laser annealing)	As under "Materials Sciences and Materials Application Technology"
Vacuum technology	
Surface analysis	
Chemistry and Chemical Engineering	
Molecular synthesis (design, CAMD, molecular modeling)	Active substances (pharmaceuticals, plant protection)
Supermolecular systems	Natural substance chemistry
Process measuring and control technology	Polymers
Catalysis and other methods of synthesis	Biotechnology
Organometallic compounds, catalysts	Environmental protection
Separation processes	
Medical Technology	
Electronics, sensor technology, mechanics, optronics	Imaging diagnosis and diagnostic equipment
Materials (biological compatibility)	Therapy, endoscopic operating techniques
Image-enhancing tubes (TV tubes)	
	Implant materials, prosthetics
	Implanted devices (pacemakers, micro-dosing-systems)
Separation Processes	
Physics (filters, centrifuges, combined heat and pressure processes, diaphragms, osmosis, optical detectors)	Biotechnology, other chemistry and industries
	Pharmaceuticals and diagnosis
(Technical textiles)	Environmental protection
Chemistry (precipitation, catalytic conversion, crystallization)	
Biology (microorganisms)	
Analysis methods	
Sorting (identification, putting materials together, e.g., fluorescent)	

Table of Research Fields (Processes and Fields of Application) That Are to Be Included in the Analysis (Continued)

Materials and Process Level	Application Level
Biotechnology and Genetic Engineering	
Microorganisms and other organisms (plant and animal cells)	Pharmaceuticals and cosmetics
Enzymes	Medical diagnosis
Proteins and peptides	Cleaning and disinfecting
Compounds with mononucleotides	Composting, fertilizers
DNA, genome analysis	Plant protection
Fermentation processes and fermentation processes for advanced biotechnology	Energy harnessing
Measuring or study methods using microorganisms or enzymes	Treatment of raw materials and fibers
Equipment for enzymology or microbiology	Agriculture (renewable raw materials, genetically transformed plants and animals)
Analysis, separation and treatment processes	
Microgravitation	
Ecosystems and Environmental Engineering	
Separation processes	Air, soil and water pollution abatement and cleaning
Recycling methods	Dumping, incineration
Waste disposal methods	Environmentally friendly materials
Sound absorption	Renewable raw materials
Sensor technology/odor sensors	
Combining of methods (synergism effect)	
Data Systems and Communication Technology (ICT)	
Data transmission (cable, fiber-optic, satellite)	Data processing (knowledge, image and voice recognition and processing, CAD)
Data storage	Simulation
Data representation (LCDs)	Neural networks
Software development methods	Communication services(ISDN, intelligent networks, LANs, WANs)
	Data security (EDP, buildings, equipment)
	Data and knowledge transfer (databases)
	Software production environments
Energy	
Generation	
Advanced incineration methods	Economizing
Photovoltaics, solar energy	Driving systems (engines for renewable raw materials, utilization of energy of braking)
Nuclear fission (safety engineering)	Fuel cells
Nuclear fusion	Batteries
Wind	Heat pumps
Biomass	Hydrogen utilization processes
Refuse incineration	
Conversion (loss minimization)	
Transport	
Storage (hydrogen)	
Reprocessing of nuclear fuel	
Transportation	
Traffic data acquisition and automated plotting of measured values	Traffic control systems (LISB, Prometheus)
Satellite observation of traffic flow	Road-rail-air linking and coordination
Climate Research (Biosphere)	
Gaseous pollutants (CO_2, chlorofluorocarbons, NO_x, HC, etc.)	Forest damage
Metrology for ecosystems	Climate changes
Mobile on-line measuring techniques	Health and prevention
-for conveyance of pollutants in the atmosphere and every other medium (including aerosols)	
-for vehicle emissions	
Oceanography/limnology/glaciology	
Interactions in the biosphere	

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France: Airbus Industrie Set-Back Blamed on Order Cancellations

94WS0183A Paris LE MONDE in French 5 Jan 94 p 18

[Article by Martine Laronche: "Consequence of the Air Transport Crisis: Airbus Industrie Received 59 Order Cancellations in 1993"]

[Text] Airbus Industrie will not present its results this year. No official reason was given, but this was a particularly difficult year for the aeronautical industry (LE MONDE, December 28, 1993). Overall, Airbus Industrie is said to have received some 59 order cancellations in 1993 and a total of 38 orders, yielding a negative balance of 21 aircraft. In 1992, the European aircraft manufacturer had a better year, with 136 orders for 95 cancellations.

The manufacturer was particularly hard hit by order cancellations from the Irish company GPA (Guiness Peat Aviation). Last May, GPA was saved from bankruptcy by the U.S. group General Electric. In September, it announced a drastic restructuring plan. Airbus was more affected than Boeing, as its firm orders dropped from 91 aircraft (for delivery during 1993-2000) to only six to be delivered in 1997 and 1998. After this cancellation, the Toulouse-based consortium recalled that it still had orders for a total of 55 aircraft—mostly A-320s and A-321s—to be delivered to GPA by the year 2000.

These mediocre results are due to poor economic conditions for airlines. Following an all-time high deficit of $4.8 billion in 1992, based on figures published by the IATA [International Air Transport Association], their losses are expected to total $2.4 billion this year. The overcapacity crisis drove airlines into a price war. In this context, they drew up drastic fleet and staff restructuring plans. Airbus Industrie is obviously not the only manufacturer to bear the brunt of these. For its part, Boeing announced a few weeks ago that it had received 226 orders during the year, but 214 airplanes were retired.

Nevertheless, the European manufacturer's deliveries proceeded at a satisfactory pace. They should account for 138 aircraft in 1993, compared with 157 in 1992, which was a very good year. However, sales should be higher in 1993 than in 1992 ($7.6 billion) because of the delivery of long-haul A-340 jumbo jets.

On the bright side, 1993 was marked by the introduction of the Airbus A-319 carrier at the Le Bourget Show. The A-340 was set into service in March 1993 at Lufthansa and Air France, and the first A-330 was delivered to its launching airline, Air Inter, in December.

Creation of Military Branch of Airbus Industrie Considered

BR0102115494 Paris LE NOUVEL ECONOMISTE in French 28 Jan 94 p 68

[Article by Philippe Gallard: "A Khaki Airbus"]

[Text] The beasts of burden of French aviation are worn out. The humble stars of current events, the 82 Transall and Hercules C130 aircraft of the military transport fleet see service in all armed interventions and all humanitarian operations. These aircraft, 30 or more years old, will have to be replaced just after the year 2000. This retirement date is scheduled even sooner in Great Britain and is similarly close in Germany (co-producer of the Transall), Spain, and Italy. Their replacement by a European "future large aircraft" (FLA) has become a burning, even explosive issue since eight chiefs of staff for the Army and Air Force met in Paris on 20 December at a meeting chaired by French General Lanata.

This meeting uncovered three weighty issues: The creation of a military subsidiary of Airbus Industrie; the possible invention of a new mode of financing in response to the American GATT challenge; and the development of a new type of engine by [French national aircraft engine manufacturer] SNECMA in association with European partners. The role of party-pooper was played by the American company Lockheed with its offer of a share in the production of the updated Hercules C130-J. The Americans have courted British manufacturers with subcontracting offers worth more than 10 billion French francs [Fr].

All this crazed commotion has one aim: to reduce the estimated cost of the FLA by one-third from its initial Fr35 billion for 200 aircraft. Public paymasters gagged when this price was announced, and began to eye offers from America (Lockheed) and the Ukraine (Antonov) that were proposing new versions of old models. French military officials, however, considered any deal with the Ukraine to be too risky. As for the Hercules C130-J, they found its cargo bay too narrow. "We need an aircraft with a fuselage diameter of four meters—like the large Airbuses and the FLA project—so that we can carry large helicopters or anti-aircraft missile batteries without the need to ask the Americans if they would be kind enough to lend us planes bigger than the Hercules," General Lanata insisted. It appears that he convinced his colleagues that it would be better to cut down the FLA estimate rather than make do with the diameter of the American aircraft.

The first novelty was that, instead of the usual step of creating a new, tailor-made industrial consortium, the partners want to adopt the mold and procedures of Airbus Industrie. The idea is to create a military subsidiary where the four majority Airbus partners would be joined at least by the Italian company Alenia, if not by a Belgian, Portuguese, or Turkish manufacturer, since these are the other partners and future customers of the FLA project. The advantages of this are two-fold: Participants would profit from the efficiency of the methods used in civil aviation; and a gateway would be created for channeling public subsidies from the military to the civilian branch. Since the military is not subject to the requirements of GATT, this subsidiary could, without fear of reprisals, receive uncapped refundable loans if the participating are unable to fund the aircraft's development. After all, Boeing is currently hoping to receive an order for 80 Boeing 747's for military transport, which at the present rate of production represents more than three years' work for the jumbo assembly line.

Second, the generals will content themselves with a simpler aircraft, with less ambitious equipment for the mass-produced aircraft, and quite different engines. The forces want both an airliner capable of flying long distances at high speeds, which had led to the decision of a four-engined model, and an assault plane capable of landing on an clay runway or a plowed field, which requires turboprop engines. This second solution is 10 percent less expensive. Meeting this week in Rome, manufacturers from eight countries know that the choice of engine will be crucial. Opposition between Rolls Royce and SNECMA 10 years ago blew apart the European fighter plane project. Now it looks like a showdown between the young Anglo-German partnership of Rolls Royce and BMW and the new French-German pairing of SNECMA and MTU [Engines and Turbines United]. Both groups have at least a "core" that can be used as the basis for a high-speed turboprop engine capable of reaching speeds of 800 kph. Aircraft manufacturers and European chiefs of staff are keeping their fingers crossed that history does not repeat itself.

Volvo's New Leadership To Decide on Alliance With Renault

94WS0200B Paris LE MONDE in French 21 Jan 94 p 18

[Unattributed article: "Elected by Shareholders on Wednesday 19 January, the Volvo Board of Directors Will Have to Clarify Its Relations With Renault"]

[Text] Volvo shareholders elected their new board of directors during a special meeting held on Wednesday 19 January, in Goteborg. Bert-Olof Svanholm, currently general director for Sweden of the Swedish-Swiss industrial group ABB Asea Brown Boveri, was elected chairman of the board, replacing Pehr G. Gyllenhammar. His first task will be to determine what he intends to retain from the partnership agreement signed with Renault in 1990.

Mr. Svanholm, 58, was nominated in December by a group of large Volvo shareholders, representing together about 40 percent of the board of directors votes, to succeed Mr. Gyllenhammar who resigned on 2 December 1993 after

the failure of the planned merger with Renault. In addition to Mr. Svanholm, six new directors were appointed at the meeting of shareholders; one of them is Louis Schweitzer, CEO [chief executive officer] of Renault, the largest Volvo shareholder with nearly 10 percent of its capital. However, Mr. Schweitzer did not attend the Goteborg meeting.

The other directors are Per-Olof Ericsson (general director of the Sandvik group—special steels, tools), Haakan Frisinger (former general director of Volvo from 1983 to 1987), Tom Hedelius (president of the Handelsbanken [Commerce Bank]), Bjoern Svedberg (president of the S.E. Banken), and Soren Gyll, the current Volvo general director. Three union representatives also sit on the board.

Speaking to some 700 shareholders, Mr. Gyll declined to give any material precision concerning Volvo's future strategy and the future of the Renault-Volvo partnership set up in 1990 by the two manufacturers. "The forms that the partnership or non-partnership with Renault should take are a priority for both Volvo and Renault," Mr. Svanholm merely stated.

The next regular general meeting of the board, scheduled for 20 April, will consider this matter, as well as that of the Swedish group's industrial strategy.

Aerospatiale's 1993 Figures Summarized

Paris AFP SCIENCES in French 6 Jan 94 pp 10, 11

[Unsigned article: "Aerospatiale Cut its Losses in 1993"]

[Text] Paris—Aerospatiale "substantially" cut its losses in 1993 compared to 1992 in spite of "some of the worst circumstances it has ever experienced" and the French group expects no recovery in 1994, according to a statement by its president, Louis Gallois on 5 January.

In 1992 the French aeronautics manufacturer recorded a net loss of 2380 billion francs. Gallois estimated that "balance should be achieved in 1995 at the latest." The turnover figure for 1993 should be five percent lower and reach about 49.3 billion francs, plus or minus one hundred million francs, compared to 51.9 in 1992.

According to the Aerospatiale president, the group hit "bottom" in 1993, "even if recovery cannot be expected for 1994; the situation will not improve before 1996-97. In 1993, the markets were awful for the civilian sector (planes, helicopters), stable for the military sector, and rather good in the space sector."

Gallois reaffirmed that the anticipated privatization of the group will not take place in 1994 nor in 1995, but he still did not rule out minority shareholding in the enterprise's capital during that period. The French groups Matra and Alcatel have already expressed interest in Aerospatiale, and so has DASA (Germany), an already very large partner in the French group.

Total orders (planes, helicopters, and military and civilian space) have dropped—to 29 billion francs in 1993 compared to 39 billion in 1992—"despite increases in military orders for export, and in space orders." At the end of the year, orders amounted to 130 billion francs, representing two and a half years of activity according to Gallois.

Concerning orders for planes with over 100 seats, 1993 was a "blank year" and this was also true for competitors Boeing and McDonnell Douglas: "cancellations slightly exceeded orders." Gallois did not give specific figures for order cancellations at Airbus for last year. However, indications from aeronautics sources are that these amounted to 59, compared to 38 orders. But the number of firm orders is uncertain since some aircraft sold in Indonesia are excluded, as are Cathay Pacific and Air Canada planes, orders for which were announced in December. Referring indirectly to Mirage sales in Taiwan, Gallois noted "the emergence" of Boeing on the Chinese market against Airbus "whose activity there is in slow-motion."

ATR (the Alenia-Aerospatiale consortium) recorded 31 firm orders in 1994. In this field of regional aircraft, Gallois confirmed that there are discussions with other manufacturers, Fokker, Dornier, BAE, CASA, Saab, but also Embraer (Brazil), or De Havilland (Canada), and he mentioned that several Asian countries are definitely interested in the construction of planes of this type. According to him, the ATR-82 (which will likely be an 80-passenger turbo-prop) could be the key to this future field.

In the military field, Mr Gallois found that 1993 showed "export recovery" and was a particularly "good year for missiles." Lastly, Eurocopter, the joint subsidiary of DASA and Aerospatiale, felt the collapse of the civilian market but still managed to increase its market share. In 1993, orders for mass produced helicopters totaled more than in 1992. Eurocopter regained its 20 percent share of the world military market, which it had abandoned since the Gulf War, thanks to the Turkish and Netherlands contracts announced at the end of the year.

EAST-WEST RELATIONS

EU Funds To Help Convert Russian Defense Industry

BR2801131394 Didcot INTERFACE EUROPE in English Dec 93 p16

[Unattributed report: "EC to Help Convert Former Soviet Defence Industries"]

[Text] Funds from the EC's TACIS [Assistance Program to the CIS] programme are to help switch former Soviet defence industries to civilian production. Some Ecu 4.5 million will go to four former Soviet regions: St. Petersburg and Samara (Russia); Kharkov (Ukraine); and Minsk (Belarus). The industries concerned employ about 12 million people, of whom five million work in weapons production. The 30-month project will be run by British Aerospace and the French consultancy Softrade Intergroupe.

European Commission S&T Aid for Eastern Europe

BR0501132894 Luxembourg INNOVATION PLUS TECHNOLOGY TRANSFER in English Oct 93 p 12

[Unattributed article: "194 New Projects for Eastern Europe"]

[Text] The Commission has selected 194 new projects under its scientific and technological cooperation scheme with the countries of Central and Eastern Europe: Albania, Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, Slovenia. The projects will involve a total of 666 partners and will receive ECU31.4 million assistance in 1993.

A large number of projects have already been supported by the Commission since the scheme was launched and these absorbed the full amount of ECU55 million earmarked for 1992.

Those projects consisted in particular in the award of 2,531 study grants to researchers from the East, enabling them to spend an average of three months in some of the Community's leading laboratories and to acquire fresh knowhow to be put to use on their return home, while establishing valuable contacts for the development of networks in the future. Support was also given for scientific conferences, seminars and workshops and for projects to develop pan-European scientific networks and to enable Central and Eastern Europe to participate in Community research programmes or COST projects (European cooperation in the field of scientific and technical research).

Bull Hungary Reorganizes Its Leadership

93P60205 Budapest COMPUTERWORLD/ SZAMITASTECHNIKA in Hungarian 23 Nov 93 p 7

(Text) The Hungarian branch of the French computer firm Bull has just implemented a management personnel change. The position of managing director Gerlai Matyas—after the OKHB's [National Commercial and Credit Bank] 25 percent buy-out—ceased to exist, and, at the end of October, his French managing partner Ives Thon's commission also expired. On 1 November, their combined positions have been taken by the 37-year-old economist Gert-Jan de Kieviet, freshly arrived from the Netherlands. His career at Bull began in 1989—earlier he was the vice-president of an insurance association—and by 1991 he had become the head of Bull's social security department.

According to Mr. Kieviet—whose opinion had been influenced by an IDC [Information and Documentation Center] analysis on the Hungarian computer industry—in recent years, Bull Hungary's strength has developed exactly in areas for which IDC predicted the greatest growth potential: value-added (complementary) services, applications (ready-made, complete solution), and the PC sector, respectively.

In reference to the future, Mr. Kieviet expressed his intent to make the company a market leader in distributed computing architecture and systems integration: he will not be a simple box-seller, but wants to transform Bull Hungary into a production unit with its activities focussed on open systems solutions and services while "working together with consumers as teams". In the West, the switch-over to open systems is extremely expensive and cumbersome, due to the already installed, custom-designed systems—made up of a large number of computers—and due to the software written for them.

In this respect, Hungary enjoys a much luckier position. Others, beside Mr. Kieviet, are also looking for these new avenues: For instance, presently, a French banking specialist is investigating ways to adapt Bull applications to Hungarian conditions.

Mr. Kieviet places a great enphasis on applications and complete solutions; according to his experience, not only in Hungary is Bull considered by many to be just a hardware and software manufacturer. The new CEO would like, by all means, to change this image, showing the Hungarian market how complete the Bull product line actually is.

He also wishes to introduce a more efficient management: He believes that the marketing division must not rigidly separate from the other branches. At year's end, the commission of commercial director Jean-Luc Chalant will also expire: His activity will be covered by existing personnel.

The new director has been preparing for the new assignment since last summer, by diligently studying Hungarian, familiarizing himself with the country. He confesses to have found many similarities between Hungary and the Netherlands.

Europe, CIS to Conduct 509 Science R&D Projects

94WS0174B Paris AFP SCIENCES in French 23 Dec 93 pp 2, 3

[Unattributed article: "500 Europe-CIS [Commonwealth of Independent States] Scientific Cooperation Projects To Be Launched"]

[Text] Brussels—On 22 December, the European Commission announced that over 500 cooperation projects between European and CIS laboratories would be launched, with the assistance of the International Association to Promote Cooperation with Scientists in the New Independent States of the former USSR (Intas).

The Intas, which was created on the initiative of the European Commission, will contribute up to 21 million ECUs to these 509 projects, each of which associates at least two European laboratories and one laboratory in a former USSR country. The funds will be used primarily to pay CIS researchers.

The projects selected concern all scientific fields, from the exact and natural sciences to the applied, social, and economic sciences. The principle of this cooperation is to ensure that laboratories remain in the new CIS states and are able to continue their work.

Created in June 1993, the Intas includes the twelve members of the European Union, Austria, Finland, and Switzerland, and the twelve members of the CIS.

France, Bulgaria Sign Nuclear Energy Agreement

94WS0220A Paris AFP SCIENCES in French 20 Jan 94 p 27

[Article: "Bulgaria: EDF Continues Cooperation on Kozlodoui Power Plant"]

[Text] French Power Company [EDF] has signed cooperation accord with Energy of Bulgaria officials covering operation and modernization of the Kozlodoui power plant, EDF announced on 18 January.

The accord signed with the Bulgarian Energy Committee and the Bulgarian state-owned power company NEK identifies areas and modalities of Franco-Bulgarian cooperation over the next three years. In addition to the Kozlodoui plant, it provides for continuation of cooperation agreements in the domain of power system management.

Among other things, the agreement provides for creation of permanent structures for dialogue and for bilateral financing of high-priority nuclear safety improvements. This financing will come in addition to funds put at the Bulgarians' disposal by international agencies.

Franco-Bulgarian cooperation, launched in 1991 with the help of European Community funding, has facilitated rehabilitation of the Kozlodoui 1 and 2 generating units, which started up again recently and are now "operating within acceptable safety parameters." NEK has benefited from constant organizational and management support since early 1993.

The Kozlodoui plant generates 10.5 billion kilowatt-hours per year, accounting for all of Bulgaria's nuclear energy production and 33 percent of the country's electricity. Kozlodoui has six generating units equipped with Soviet pressurized-water (VVER) reactors; the first four of them had safety problems, according to international experts.

EUROPE-ASIA RELATIONS

Samsung Seeks Larger Share of EC Semiconductor Market

BR0501144794 Paris ELECTRONIQUE INTERNATIONAL HEBDO in French 9 Dec 93 p 15

[Article signed E.F.: "Samsung To Focus on Application-Specific Circuits in Europe"]

[Text] The Korean company Samsung is counting on its 300,000- gate array circuits and on its rapid prototyping service to expand into the consumer, information technology, and telecommunications markets.

Samsung, whose ASIC [application-specific integrated circuits] activity represents less than one percent of its European revenues in semiconductors ($500 million in 1993, up 50 percent on a world total of $2.3 billion), intends to do something about this situation and, quoting Samsung Semiconductor Europe spokesman Peter Anders, "to diversify into a more stable market than the memory market." His objective for 1994 is a sales figure of $10 million in this area. To achieve this the Korean company, which has just installed its first European design center near Frankfurt in Germany, is planning to open design centers in all major continental European countries in the coming year.

As for products, Samsung is now offering a range of gate arrays in 0.65-micron CMOS [complementary metal oxide semiconductor] technology integrating a maximum of 300,000 gates and operating at 3.3-V voltage in Europe. A range of standard cell circuits, enabling up to 350,000 gates to be integrated in the same 0.65-micron technology, should be available by mid-1994. Samsung is aiming at mid-range consumer, information technology, and telecommunications applications, where it has a certain expertise and where it can take advantage of what is considers its two strongest points: the availability of cell libraries comprising digital signal processors (DSP) and microcontrollers (Z80 compatible); and its rapid prototyping capacity (25 days for standard cell circuits and 45 days for gate arrays).

Japan, Spain Develop Automatic Track-Gauge Changer

94WS0147A Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 24 Nov 93 p 8

[Article by P.O.: "The Train Changes Track Gauge Automatically"]

[Text] Talgo SA of Madrid, Spain, will develop a system in cooperation with the Japanese steel producer and mechanical engineering firm Sumitomo Metal Industries Ltd., Osaka, which will allow railroad cars automatically to change the track width of the wheelsets. There is a simple reason for Sumitomo's particular interest in further development of the Spanish technique.

Since the Japanese railways were split up and privatized in 1987, competition between the railroad companies has increased a great deal. The declared goal of numerous railroad enterprises is to attract more passengers with a higher level of comfort. Since with the traditionally overfilled Japanese trains it will hardly be possible to improve the comfort of the cars themselves, the railroad companies are primarily intent on eliminating the need for many transfers. In numerous cases, however, this is only possible if at certain points the trains can change their track gauge rapidly.

The Spanish Talgo system originated out of the necessity of changing tracks for foreign trains when transferring to the broader Spanish gauge. In order to do so, the train runs at slow speed over a 15-meter-long gauge conversion track. In addition to the normal rails, additional rails have here been mounted on both sides. The railroad car also has so-called yoke elements mounted on the wheels, also on both sides.

The yoke elements are lowered at the rail section parallel with the actual track. In so doing they lift the train slightly.

This leaves the wheels free for a brief moment. At this moment the guide rails press the wheels into the new position—that is to say either onto the narrower or, in the opposite direction, onto the broader track.

Sumitomo and Talgo now want jointly to improve this technique and, according to their own information, initially aim particularly for the Japanese market, where in this respect demand is extremely intense. In Japan a truck with four wheels dominates, while in Spain there are two-wheel elements. Further, in Japan on countless trains the wheels of the trucks of individual cars are directly driven, while in Spain the trains are almost exclusively pulled or pushed by separate locomotives.

Consequently, trucks and driving wheels must now be developed—based on the Talgo system described—which can be similarly automatically adapted. The prototypes of powered, convertible trucks are to be ready for testing during the course of 1995.

Matra Achieves 50-Percent Growth in Asia

94WS0128C Paris PRODUCTIQUE/AFFAIRES in French 20 Nov 93 pp 5-6

[Article: "Average Growth Rate of 50 Percent for Matra Datavision in Asia"]

[Text] Since opening its first office in Hong Kong in 1990, Matra Datavision has experienced an average growth rate of 50 percent in the Asian countries. The group's agents and distributors have posted sales totaling 50 million francs for 1993. Euclid, the CAD/CAM [computer-aided design and manufacturing] software, is already being used by over 200 customers, including CAST (an aerospace firm in the PRC), Ssang Yong Motors (an automotive firm in Korea), Siam Cement (the largest industrial group in Thailand), the HCG (ceramics in Taiwan), Ching Sum (a mold manufacturer in Hong Kong), First Automobile Works (an automotive firm in the PRC), and, more recently, Singapore Polytechnics. The company's success is due to proximity, local support, appropriate training, and personal attention. A training center for training and support was opened in Beijing in 1992, an office will open there before the end of the year, and Euclid has been translated into Chinese and Korean.

PSA to Sell Diesel Engines to Honda

94WS0172C Paris L'USINE NOUVELLE in French 2 Dec 93 p 50

[Unattributed article: "Peugeot Will Supply Diesel Engines to Honda in 1994"]

[Text] Jacques Calvet is fighting against the Japanese invasion of Europe. But that will not prevent Peugeot from supplying diesel engines to Honda. Early next year, the Japanese manufacturer is expected to offer a diesel version of its mid-range Concerto sedan, the mechanical equipment of which will come from Tremery (Moselle). A cousin of the British Rover 200 and 400, which already use that engine, the Concerto will be reserved to the French market. Sales are expected to reach 3,500 units in 1994. Early this year, however, Honda started designing a clean diesel engine.

Daimler-Benz Obtains Semiconductor Know-How From Mitsubishi

94WS0144C Duesseldorf HANDELSBLATT in German 2 Dec 93 p 19

[Article by FO: "Daimler-Benz/Mitsubishi: Fifth Summit Meeting With Concrete Agreements; Semiconductor Know-How From Japan for Company Subsidiary Temic Secured"]

[Text] Berlin, HANDELSBLATT, Wednesday, 1 Dec—Temic (Telefunken Microelectronics, Ltd.), a subsidiary of Daimler-Benz, has secured the semiconductor know-how of the Mitsubishi Electric Corporation. Access to the so-called CMOS [complementary metal oxide semiconductor] technology has been opened through a license, something that company head Edward Reuter described as a "milestone" in cooperation with the Japanese Mitsubishi combine.

The Temic agreement is part of a package of projects which was agreed on by the top managers of both companies on Tuesday in Berlin (which has already been reported in another section of HANDELSBLATT). With it, according to Shinroku Morohashi, the chairman of the Mitsubishi Corporation, six of a total of 35 planned joint ventures can be realized.

Morohashi and Reuter described the fifth meeting as extraordinarily successful. Reuter confronted critics of the talks held between the two technology combines for three and a half years now with the fact that the participants had been "not so impatient" and the contacts "somewhat longer-term" deliberately. Morohashi indirectly explained the obviously difficult rapprochement of the Germans and Japanese as being attributable to "different management methods" and "a different corporate philosophy."

They also reached a concrete stage on the planned joint construction of a metallurgical recycling plant for used cars in Germany. According to Reuter, two locations for the DM100-million project, in which the Austrian firm, Voest Alpine, is also to be participating, are being studied. Mercedes-Benz and Mitsubishi want to examine the cost effectiveness of the technology with this pilot plant. Another cooperative project involves joint research in the field of recycling of plastics.

However, an agreement in principle is still to be negotiated in detail between Mercedes-Benz and Mitsubishi Motor Corporation on the licensed production of the MItsubishi L-2000 minivan by Mercedes-Benz of South Africa. Mitsubishi is at present producing from 50,000 to 60,000 units a year of this vehicle with a payload of one ton in Japan. According to the firm, its worldwide competitors in this class of vehicle are Nissan and Toyota.

Further arrangements between Daimler and Mitsubishi involve a joint appearance at the "New Earth '93" environmental exposition in Osaka this month, various

research fields, joint purchases of materials worldwide, and management training. Furthermore, Mitsubishi wants to submit an offer to take over the general management of one or several of the buildings of the Daimler construction project on Potsdamer Platz in Berlin.

Reuter estimates that his company spends from DM50 to DM100 million a year on research and investments involving joint ventures. With more comprehensive aerospace projects, this figure could be considerably higher.

Siemens/Toshiba Semiconductor Plant in Dresden Planned

94WS0169A Frankfurt/Main FRANKFURTER ALLGEMEINE in German 22 Dec 93 pp 11,12

[Text] An "innovation center for microelectronics" is to be created in Dresden. This involves two adjacent facilities to be financed in different ways: one will be a joint project of German business to develop future technology for electronic semiconductors and the other a semiconductor factory which is being planned by Siemens in association with the Japanese electronics company Toshiba and the Center for Microelectronics in Dresden (ZMD).

Experts say that the proximity of the research institute to the production facility is particularly interesting. Following the decision of the Daimler-Benz company to manufacture their products in Rastatt, this project is also regarded as further evidence from major industries that new production projects located in Germany are possible.

With DM2.4 billion in investments spread over 10 years, this will be the largest microelectronics project in Europe. At the same time it is said to be the only production site in which the entire technology of chip manufacture will be employed in production. The project is to be presented this Thursday in Dresden by Siemens board chairman Heinrich von Pierer and Federal research minister Paul Krueger (CDU). Negotations on the project have been conducted in strict secrecy over the past three weeks. In Siemens' plan for chip manufacture, Toshiba is to acquire 25 percent of the shares and the Center for Microelectronics five percent. The Commerzbank AG and the Dresdner Bank AG are participants in the ZMD. The production center with 1,200 jobs in its final stage is to be constructed next to the ZMD research park. The companies can count on public subsidies of 35 percent of the investment total. These are not research budget funds.

The principal chip production in Dresden will be of application-specific integrated circuits (ASICs) for telecommunications and automotive electronics. The production of memory chips is possible, but is not to be of central importance. The plant is to embody the concept of the "mini-factory" for microelectronics. A modular structure is intended to ensure that the transition to the next semiconductor generation can be achieved at relatively low cost. The new factory is to begin with the 16-megabit technology and gradually widen its range to include up to 256 megabits.

The research and development unit ("nested factory") is to consist of about 100 workers. Its task is to evaluate new chip manufacturing technologies and introduce them into production. The goal is to lower the wastage rate, which is sometimes 60 percent. The companies hope that an increase in profits will partially offset the cost disadvantage in comparison with semiconductor production in low-wage countries. The experience gained in the optimization of production technologies is to be made available to all German businesses. Besides Siemens, Daimler-Benz, IBM and Bosch also figure prominently here.

These companies had already summed up their ideas over the summer after negotiations with the Federal government in a "consensus paper" on microelectronics. The Federal Research Ministry then agreed to support joint projects with other partners. The companies are reckoning on DM25 million.

For example, a personnel exchange e.g. with Bosch or Daimler-Benz is anticipated. At the beginning of December, the research ministry invited businesses to participate in the "chip factory of the 21st century." Siemens also invited other companies to work with them. The project is considered the first concrete effect of the agreements which were made as early as the spring in the "microelectronics dialog" between the ministries of research and the economy on the one side and German industry on the other. German microelectronics manufacturers had agreed to support one another in the introduction of new technologies or in cases when difficulties arose with the technology so that valuable specialized knowledge would not have to be kept within each company. Bonn says that the conditional pledge of support does not mean an about-face in research policy. It is said to be important that Germany possess not only research institutes but also production plants for the newest chip technologies. Even within the government coalition there have been varying opinions over the past few years about the question of whether the state should support production plants for microelectronics.

The construction of a Siemens factory for memory chips was already under discussion two years ago. But Siemens decided against making this investment and noted that these electronic components could also be produced in existing locations. According to the company, the decision about the plant now being planned was accelerated by the investment plans of Texas Instruments (TI) in Saxony. The company wanted to produce 64-megabit memory chips there.

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